DEPARTMENT OF CITY PLANNING 100 LARKIN STREET SAN FRANCISCO, CALIFORNIA 94102

SAN FRANCISCO CITY PLANNING COMMISSION
AND SAN FRANCISCO REDEVELOPMENT AGENCY

FINAL
ENVIRONMENTAL IMPACT REPORT
YERBA BUENA CENTER

APPENDICES

EE77-220 Draft Published: 6 January 1978

Public Hearings: 9 February 1978
14 March 1978
15 March 1978
23 March 1978
11 April 1978

Certification Date: 25 April 1978

State Clearinghouse No. 7801163

201-5

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● CHANGES FROM THE TEXT OF THE DRAFT EIR ARE INDICATED BY SOLID DOTS. A DOT TO THE LEFT OF THE FIRST LINE OF A PARAGRAPH INDICATES A NEW OR REVISED PARAGRAPH. A DOT TO THE LEFT OF A PAGE NUMBER INDICATES A NEW PAGE. A DOT TO THE LEFT OF A SECTION TITLE INDICATES AN EXTENSIVELY REVISED SECTION.

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Block & Lot No.	Land Area sq. ft.	August, 1977 PRESENT LAND USE Use	Floor Area (sq.ft.)	Building Height (stories)	ALTERNATIVE A Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE B Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE C Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE D Use	Max. Floor Space (sq.ft.)	Building Height (stories)
Central Blocks																
CB-1 (3706)																
3706-1	26,000	TP	x	--	O RC	600,000 80,000	36	O RC	560,000 40,000	32	O RC	233,000 26,000	14 or 24	O RC	233,000 26,000	14 or 24
3706-2	48,000	TP	x	--	O RC	500,000 50,000	11	RC MDUs	40,000 (100 DUs)	6-14	MDUs	200 DUs	14	O RC	396,000 48,000	14 or 24
3706-4	81,000	TP	x	--	PC	x	--	PC	x	--	PC	x	--	O RC O RC O RC	240,000 26,000 218,000 24,000 269,000 30,000	10 10 10
3706-5	19,000	TP	x	--	O RC	180,000 20,000	10	O RC	130,000 20,000	10	O RC	30,000 20,000	3	O RC	30,000 20,000	3
3706-6	15,000	O RC	81,800 (vacant) 9,000	10	O RC	82,000 9,000	10	O RC	82,000 9,000	10	O RC	82,000 9,000	10	O RC	82,000 9,000	10
3706-7	46,000	TP	x	--	O RC	450,000 50,000	24-32	O RC	470,000 30,000	24-32	O RC	304,000 46,000	8	O RC	304,000 46,000	8
3706-8	17,000	VB	25,000 (vacant)	2	O RC	10,000 15,000	2	O RC	10,000 15,000	2	O RC	10,000 15,000	2	O RC	10,000 15,000	2
3706-9	7,000	TP	x	--	O RC	55,000 14,000	7	RC	6,900	2	O RC	43,000 7,000	7	O RC	43,000 7,000	7
3706-13, 13A, 14	21,000	CS	Church & Rectory	3+1	CS	Church & Rectory	3+1	CS	Church & Rectory	3+1	CS	Church & Rectory	3+1	CS	Church & Rectory	3+1
CB-2 3723	454,000	V	348,000^x	--	O	797,000 *(Lot A)*	24-32	O	455,000 *(Lot A)*		P	x	--	DS (Office)	2,157,500 (4 towers, 4 lots)	14-15 14-15 14-15 14-15
		TP	105,000^x	--	RC	266,000 *(Lot A)*	2	RC	152,000 *(Lot A)*	1						
					MDU	50 DUs *(Lot A)*		MDU	50 DUs *(Lot A)*							
					PC	82,500 *(Lot B)*				--						
					O	700,000 [illegible]	24-32	CE	303,000 *(Land Area)* *(Lots B & C)*	0-3						
					RC	40,000 *(Lot C)*	1									
					CE	400,000 *(Lot C)*	4-6									
					H	700 rooms *(Lot C)*										
CB-3 3734	454,000	V	118,000	--	CF	Convention Facility	Under-ground	CF	Convention Facility	Under-ground	P	x	--	DS	796,000 *(Office)*	24
		TP	336,000	--										DS DS DS	796,000 796,000 796,000	7 7 7

(Table continued)

TABLE A-1 CONTINUED

Block & Lot No.	Land Area sq. ft.	August, 1977 PRESENT LAND USE Use	Floor Area (sq.ft.)	Building Height (stories)	ALTERNATIVE A Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE B Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE C Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE D Use	Max. Floor Space (sq.ft.)	Building Height (stories)
Eastern Blocks																
EB-1 (3707)																
3707-A	32,000	O&RC	100,000[D]	3,3,2,+5	O RC	586,000 60,000	32-46	RC MDU	25,000 (400 DUs)	24-32	O RC	218,000 32,000	14	O	446,000	14-24
3707-B	1,000	O	7,000	5	O	7,000	5	O	7,000	5	O	7,000	5	O	7,000	5
3707-32	1,400	O&RC	13,000	5	O&RC	13,000	5	O&RC	13,000	5	O&RC	13,000	5	O&RC	13,000	5
EB-2 (3722)																
3722-A	33,000	O&RC TP	48,000[O] 26,800[x]	2+7 --	O	669,000	32-46	O	500,000	32-36	O RC	167,000 33,000	14	O RC	429,000 33,000	14
3722-8	75,000 + 16,000	TP TP	x 25,600[D]	-- 2	O RC PP	618,000 20,000 (500 spaces)	32-36 6-8	O	400,000	32	MDU	(300 DUs)	11	O DS	364,000 (Lot 1) 123,000 (Lot 2)	14 7
3722-27	7,300	O&RC	21,000	2	O&RC	21,000	2	O&RC	21,000	2	O&RC	21,000	2	O&RC	21,000	2
EB-3(3735)																
3735-A	73,000	TP V	67,500[x] 5,200[x]	-- --	O	687,000	9	PP	(1,250 spaces)	6	MDU	(300 DUs)	10	DS	509,000	7 or 15
3735-C	8,000	RC	8,100[x][O]	4	O	56,500	14	O	56,700	14	O RC	49,000 8,000	14	DS	56,525	7
3735-9	6,750	DS	13,300	2	DS	13,300	2	DS	13,300	2	DS	13,300	2	DS	13,300	2
3735-10	17,600	DS	46,800	3	DS	46,800	3	DS	46,800	3	DS	46,800	3	DS	46,800	3
3735-12	17,000	O	104,300	5	O	104,000	5	O	104,300	5	O	104,300	5	O	104,300	5
3735-13, 14,17	67,000	O	616,000	11	O	616,000	11	O	616,000	11	O	616,000	11	O	616,000	11
3735-15&16	16,800	DSP	16,800[x]	3	DSP	16,800[x]	3	DSP	16,800[x]	3	DSP	16,800[x]	3	DSP	16,800[x]	3
3735-46	26,000	O DSP	92,900 + 34,800	8	O DSP	92,900 + 34,800	8	O DSP	92,900 + 34,800	8	O DSP	92,900 + 34,800	8	O DSP	92,900 + 34,800	8
3735-55	21,000	O DSP	19,800 + 21,000	2	O DSP	19,800 + 21,000	2	O DSP	19,800 + 21,000	2	O DSP	19,800 + 21,000	2	O DSP	19,800 + 21,000	2
3735-56	48,000	DSP	x	--	DSP	x	--	DSP	x	--	DSP	x	--	DSP	x	--

(Table continued)

TABLE A-1 CONTINUED

Block & Lot No.	Land Area sq. ft.	August, 1977 PRESENT LAND USE Use	Floor Area (sq.ft.)	Building Height (stories)	ALTERNATIVE A Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE B Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE C Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE D Use	Max. Floor Space (sq.ft.)	Building Height (stories)
Southern Blocks																
SB-1 (3752)																
3752-A	3,600	V	x	--	LI	18,000	6	LI	18,000	6	LI	21,600	6	LI	21,600	6
3752-B	12,000	CS OSP	17,600 + 3,000x	2	CS OSP	17,600 + 3,000x	2	CS OSP	17,600 + 3,000x	2	CS OSP	17,600 + 3,000x	2	CS OSP	17,600 + 3,000x	2
3752-C	12,400	TP V	11,250x 1,100x	--	RC	61,900	5	O RC	50,000 12,000	5	O RC	50,000 12,000	5	RC	61,875	5
3752-D	6,000	EDU	(278 DUs)	10	EDU	(278 DUs)	10	EDU	(278 DUs)	10	EDU	(278 DUs)	10	EDU	(278 DUs)	10
3752-2&3	8,800	LI OSP	7,750 1,900x	2	LI OSP	7,750 1,900x	2	LI OSP	7,750 1,900x	2	LI OSP	7,750 1,900x	2	LI OSP	7,750 1,900x	2
3752-11	4,000	RC	10,000	2	RC	10,000	2	RC	10,000	2	RC	10,000	2	RC	10,000	2
3752-11A	8,800	LI	17,600	2	LI	17,600	2	LI	17,600	2	LI	17,600	2	LI	17,600	2
SB-2 (3751)																
3751-A	90,000	O	400,000	7	O	400,000	7	O	400,000	7	O	400,000	7	O	400,000	7
3751-F, 105,112	41,000	O	168,000	6	O	168,000	6	O	168,000	6	O	168,000	6	O	168,000	6
3751-8	85,000	TP V	54,000x 23,200x 8,000x (street)	--	LI	426,000	5	FDU	(100 DUs)	3	FDU	(100 DUs)	3	LI	470,701	6
3751-J	1,250	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--
3751-K	1,600	V	x	--	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--
3751-L	900	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--
3751-N	2,000	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--
3751-T	1,000	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--
3751-P	16,800	TP	x	--	LI	83,800	5	LI	99,000	6	LI	99,000	6	LI	99,000	6
3751-Q+R	48,000	V	x	--	EDU	140 DUs +70 spaces	8	EDU	140 DUs +70 spaces	8	EDU	140 DUs +70 spaces	8	EDU	140 DUs +70 spaces	8
3751-S	17,900	TP	x	--	LI	89,000	5	FDU	20 DUs	2-3	FDU	20 DUs	2-3	LI	89,000	5
3751-H	36,700	V	x	--	EDU	200 DUs +50 spaces	9	EDU	200 DUs +50 spaces	9	EDU	200 DUs +50 spaces	9	EDU	200 DUs +50 spaces	9
3751-28	2,000	LI	2,600	2	LI	2,600	2	LI	2,600	2	LI	2,600	2	LI	2,600	2
3751-29	6,400	LI	6,400	1	LI	6,400	1	LI	6,400	1	LI	6,400	1	LI	6,400	1
3751-32	5,400	LI	2,600	2	LI	2,600	2	LI	2,600	2	LI	2,600	2	LI	2,600	2
3751-33	2,600	LI	3,200	2	LI	3,200	2	LI	3,200	2	LI	3,200	2	LI	3,200	2
3751-34	2,200	LI	2,800	2	LI	2,800	2	LI	2,800	2	LI	2,800	2	LI	2,800	2

(Table Continued)

TABLE A-1 CONTINUED

Block & Lot No.	Land Area sq. ft.	August, 1977 PRESENT LANO USE			ALTERNATIVE A			ALTERNATIVE B			ALTERNATIVE C			ALTERNATIVE 0		
		Use	Floor Space (sq.ft.)	Building Height (stories)	Use	Max. Floor Space (sq.ft.)	Building Height (stories)	Use	Max. Floor Space (sq.ft.)	Building Height (stories)	Use	Max. Floor Space (sq.ft.)	Building Height (stories)	Use	Max. Floor Space (sq.ft.)	Building Height (stories)
3751-78	4,100	LI	4,500	2	LI	4,500	2	LI	4,500	2	LI	4,500	2	LI	4,500	2
3751-79	5,400	OS	10,500	2	OS	10,500	2	OS	10,500	2	OS	10,500	2	OS	10,500	2
3751-150	12,000	LI 0 OSP	6,000 5,500 6,000x	2	LI 0 OSP	6,000 5,500 6,000x	2	LI 0 OSP	6,000 5,500 6,000x	2	LI 0 DSP	6,000 5,500 6,000x	2	LI 0 OSP	6,000 5,500 6,000x	2
SB-3 (3750)																
3750-A	57,750	V	x	--	LI	288,750	5	FOU	90 OUs	3	FOU	180 OUs (with C)	10	LI	32B,000	6
3750-B	9,900	TP	x	--	LI	50,000	5	LI	50,000	5	LI	50,000	5	LI	50,000	5
3750=C	61,000	TP V	38,000x 23,000x	-- --	PP	760 spaces	--	FOU	90 OUs	6	FOU	OUs with A		LI	304,000	5
3750-0	6,000	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--	OSP	x	--
3750-9	8,900	0 OSP	12,000 3,600x	2	0 OSP	12,000 3,600x	2	0 DSP	12,000 3,600x	2	0 OSP	12,000 3,600x	2	0 OSP	12,000 3,600x	2
3750-13	7,300	LI	9,000	2	LI	9,000	2	LI	9,000	2	LI	9,000	2	LI	9,000	2
3750-14, 15,E	22,500	RC	x (gas station)	1	RC	x (gas station)	1	RC	x (gas station)	1	RC	x (gas station)	1	RC	x (gas station)	1
3750-45	10,100	LI	16,600	2	LI	16,600	2	LI	16,600	2	LI	16,600	2	LI	16,600	2
3750-50	7,100	RC	12,B00	2	RC	12,800	2	RC	12,800	2	RC	12,B00	2	RC	12,B00	2
3750-53	4,300	LI	3,800	1	LI	3,800	1	LI	3,800	1	LI	3,800	1	LI	3,800	1
3750-54	11,300	LI	19,800	2	LI	19,800	2	LI	19,800	2	LI	19,800	2	LI	19,800	2
SB-4 (3763)																
3763-A, B+C	35,000	TP V	12,300x 22,800x	-- --	LI OSP	121,900 + 180 spaces	5	LI	176,000	5	LI	189,000	5	LI	189,000	5
3763-93	2,000	LI	2,750	2	LI	2,750	2	LI	2,750	2	LI	2,750	2	LI	2,750	2
3763-94	2,000	LI	2,750	2	LI	2,750	2	LI	2,750	2	LI	2,750	2	LI	2,750	2
3763-95	2,000	LI	2,750	2	LI	2,750	2	LI	2,750	2	LI	2,750	2	LI	2,750	2
3763-96	3,600	LI	4,000	2	LI	4,000	2	LI	4,000	2	LI	4,000	2	LI	4,000	2
3763-99	4,600	LI	5,000	2	LI	5,000	2	LI	5,000	2	LI	5,000	2	LI	5,000	2
3763-100	6,600	LI	8,400	2	LI	B,400	2	LI	8,400	2	LI	B,400	2	LI	8,400	2
3763-101	8,000	LI	9,000	2	LI	9,000	2	LI	9,000	2	LI	9,000	2	LI	9,000	2

(Table continued)

TABLE A-1 CONTINUED

Block & Lot No.	Land Area sq. ft.	August, 1977 PRESENT LANO USE Use	Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE A Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE B Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE C Use	Max. Floor Space (sq.ft.)	Building Height (stories)	ALTERNATIVE O Use	Max. Floor Space (sq.ft.)	Building Height (stories)
Western 8locks																
W8-1 (3705)																
37D5-A	9,750	CS	86,000	8	CS	86,000	8	CS	86,000	8	CS	86,000	8	CS	86,000	8
37D5-5	2,250	RC	5,500	2	RC	5,500	2	RC	5,500	2	RC	5,500	2	RC	5,500	2
WB-2 (3724)																
3724-A	21,000	PP	100,80D	5	PP	100,800	5	PP	100,800	5	PP	100,800	5	PP	101,000	5
3724-8	44,000	VB RC TP V	11,250 x 5,600 x 23,900 x 2,800 x	7	0	304,900	7	MDU	(100 OUs)	12	MOU	(200 OUs)	12	DS	305,000	24
3724-14	10,400	DS	28,400	2	OS	28,400	2	DS	28,400	2	OS	28,4D0	2	DS	28,400	2
WB-3 (3733)																
3733-A	43,000	TP V VB	20,500 x 10,700 x 7,200	2	EDU	(182 DUs)	8	EOU	(182 OUs)	8	EDU	(182 OUs)	8	EOU	(182 DUs)	8
3733-C	64,000	EOU	(276 DUs)	13	EOU	(276 OUs)	13	EDU	(276 OUs)	13	EDU	(276 DUs)	13	EOU	(276 DUs)	13
3733-0	15,600	V	x	--	EOU	(90 DUs)	6	EOU	(9D OUs)	6	EOU	(90 DUs)	6	EOU	(90 DUs)	6
3733-8	10,40D	CS	33,000	3	CS	33,D00	3	CS	33,000	3	CS	33,000	3	CS	33,000	3
3733-38	7,750	0	15,500	2	0	15,500	2	0	15,500	2	0	15,500	2	0	15,500	2
3733-93	14,8D0	RC	x (gas station)	1	RC	x (gas station)	1	RC	x (gas station)	1	RC	x (gas station)	1	RC	x (gas station)	1

LEGEND FOR TABLE A-1

CE	-	Commercial Entertainment (In Alternative B, Recreation/Entertainment Park)
CF	-	Convention Facility
CS	-	Community Service
D	-	To Be Demolished
DS	-	Downtown Support Service
DSP	-	Private Parking
EDU	-	Dwelling Units for Elderly (Subsidized)
FDU	-	Dwelling Units for Families (Subsidized)
H	-	Hotel
LI	-	Light Industry
MDU	-	Market-Rate Dwelling Units
O	-	Office
P	-	Park (Public)
PC	-	Pedestrian Concourse
PP	-	Public Parking
RC	-	Retail Commercial
TP	-	Temporary Parking
V	-	Vacant Lot
VB	-	Vacant Building
x	-	Land Surface Area

TABLE A-2: FLOOR AREA OF EXISTING STRUCTURES AND USES (SQUARE FEET) YERBA BUENA CENTER - AUGUST 1977

BLOCK NO.	BLOCK & LOT NO.	USE	IN-USE. OWNER PARTICIPATION FOR RETENTION	PARTIALLY USED. OWNER PARTICIPATION FOR RETENTION	VACANT. FOR RETENTION OR UNOER CONSTRUCTION	PARTIALLY USEO. PROBABLE OEMOLITION	VACANT. FOR OEMOLITION	LAND SURFACE AREA (SQ. FT.)
CB-1	3706-6	Retail-Office		90,800				15,400
	3706-8				25,000			16,700
	3706-13,13A,14	Community Service	21,000^{+}					21,500
EB-1	3707-8	Office	7,000					1,000
	3707-32	Retail-Office	3,000					1,400
	3707-A (5 structures)	Retail-Office				100,000		32,000
EB-2	3722-A (3 structures)	Retail-Office				48,000		6,200
	3722-27	Retail-Office	21,000					7,300
	3722-28	Community Service	4,400^{+}					4,400
	3722 Natoma Garage	Public Parking	26,000					12,700
EB-3	3735-C	Retail-Commercial				8,100^{+}		8,100
	3735-9	Oowntown Support	13,300					6,750
	3735-10	Oowntown Support	47,000					17,600
	3735-12	Office	104,000^{N}					17,000
	3735-13,14&17	Office	616,000^{N}					67,000
	3735-15 & 16	Oowntown Support Parking	16,800^{+}					16,800
	3735-46	Office with Parking	26,000^{N} with 35,000 Private Parking					
	3735-55	Office	19,800					21,000
SB-1	3752-B	Community Service	17,600					12,000
	3752-0	Housing	6,000^{+N}					6,000
	3752-2 & 3	Light Industrial	7,750					6,900
	3752-11	Retail Commercial	10,000					4,000
	3752-11A	Light Industrial		17,600				8,800
SB-2	3751-A	Office	400,000^{N}					90,000
	3751-F,105&112	Office			168,000^{N}			41,000
	3751-28	Light Industrial	2,600					2,000
	3751-29	Light Industrial	6,400					6,400
	3751-32	Light Industrial	2,600					2,600
	3751-33	Light Industrial	3,200					2,600
	3751-34	Light Industrial	2,800					2,200
	3751-78	Light Industrial			4,500			4,100
	3751-79	Oowntown Support	10,500					5,400
	3751-150	Light Industrial	11,500					6,000

$^{+}$-Land surface area only
^{N}-New construction

(Table continued)

TABLE A-2 CONTINUED

BLOCK NO.	BLOCK & LOT NO.	USE	IN-USE. OWNER PARTICIPATION FOR RETENTION	PARTIALLY USED. OWNER PARTICIPATION FOR RETENTION	VACANT. FOR RETENTION OR UNDER CONSTRUCTION	PARTIALLY USED. PROBABLE DEMOLITION	VACANT. FOR DEMOLITION	LAND SURFACE AREA (SQ. FT.)
SB-3	3750-9	Office	12,000					8,900
	3750-13	Light Industrial	9,000					7,300
	3750-14 & 15	Retail-Commercial			1,100[N]			23,000
	3750-45	Light Industrial	16,600					10,100
	3750-50	Retail-Commercial	12,800					7,060
	3750-53	Light Industrial	3,800					4,300
	3750-54	Light Industrial	19,800					11,300
SB-4	3763-93	Light Industrial	2,750					2,000
	3763-94	Light Industrial	2,750					2,000
	3763-95	Light Industrial	2,750					2,000
	3763-96	Light Industrial	4,000					3,600
	3763-99	Light Industrial	5,000					4,600
	3763-100	Light Industrial	8,400					6,600
	3763-101	Light Industrial	9,000					8,000
WB-1	3705-A	Community Service			86,000[N]			9,750
	3705-5	Retail-Commercial	5,500					2,250
WB-2	3724-A	Public Parking	101,000[N]					21,000
	3724-B	Vacant Retail-Office				5,600[+]	11,250[+]	16,900
	3724-14	Downtown Support Service	28,000					10,400
WB-3	3733-A	Vacant					7,200	4,000
	3733-C	Housing	64,000[+N]					64,000
	3733-8	Community Service	33,000					10,400
	3733-88	Office	15,500					9,750
	3733-93	Retail-Commercial	2,400					14,800

[+]-Land surface area only
[N]-New construction

APPENDIX B: RECOMMENDATIONS OF THE MAYOR'S SELECT COMMITTEE ON YBC, AUGUST 31, 1976/1/

The Mayor's Select Committee on YBC recommends to the Mayor the following items as a final plan for the YBC Redevelopment Project:

1. That the GSA site be included within the project area subject to financial feasibility. (As reported in the description of Alternative B, in Section IV, page 48, the use or disposition policy has not been determined by the General Services Administration; inclusion of the site is considered as a variant in this EIR.)

2. That the Jessie Street Substation be retained as an historical structure. (The Redevelopment Agency has not adopted a policy on this building.)

3. That the Mercantile Building be retained as an historical structure provided that within one year from the beginning of construction of public facilities within the project a developer/entrepreneur can be found to rehabilitate the building for institutional, retail, commercial, or adult housing facilities. (The Redevelopment Agency has an agreement with a purchaser who is preparing plans for rehabilitation of the building.)

4. That St. Patrick's Church be retained as an historical structure. (The Church will be retained as a parish church under an owner-participation agreement.)

5. That an area north of Howard St. not within the two central blocks, bounded by Mission, Folsom, Third and Fourth Sts., be land banked up to one year subsequent to commencement of the major public facilities for the purpose of providing land for 400 to 600 units of market rate housing. (Such market-rate housing is included in Alternatives B and C.)

6. That the site for an apparel mart be retained on the eastern portion of the block bounded by Mission, Howard, Third and Fourth Sts.; that the terms of the current disposition agreement be enforced with respect to the proposed apparel mart; that if there is a failure of performance under the agreement, the site of the proposed Mart shall revert to park use; and that in the event of such a failure, the developer be given all possible encouragement and assistance in constructing an apparel mart across Third St. from the present site. (The apparel mart is included in each alternative on the eastern portion of CB-2. Park use of the site is treated as a variant in Alternatives B and C.)

7. That about three million sq.ft. of office space be allowed to be built in the project outside the area bounded by Mission, Folsom, Third and Fourth Sts. (This approximate amount of office space is included in Alternative B.)

8. That 750-1,250 off-street parking stalls (in addition to privately constructed parking spaces) be built within the project area on the east side of Third St. between Howard and Folsom Sts. for off-street short-term parking. (This recommendation is reflected in Alternative B.)

9. That the agreement with TOOR be firmly endorsed including the site designations and hotel tax allocations contained therein plus any agreement with the San Francisco Redevelopment Agency for a substitute site and that the site formerly designated for the heating and cooling plant be added to the substitute site. (This has been effected.)

10. That three hundred (300) units of subsidized family housing be included within the project area, half of which will be provided for a Filipino barrio. One hundred twenty (120) units of the Filipino Barrio will be provided on the sites bounded by Folsom, Third, Harrison, Maloney, Shipley and Alice Sts. excluding the Pacific Telephone site and further, that sites for all subsidized family housing units be designated in the redevelopment plan as solely for use as subsidized family housing. (Such sites are included in Alternatives B and C in this EIR.)

11. That an exhibit hall be constructed with strong preference given to an underground facility with an urban theme park above; that the Mayor obtain an appropriately qualified developer for an appropriate urban theme park to go on the surface of the two central blocks of YBC; that an honest, thorough and convincing evaluation be made of the costs of substantially depressing the exhibit hall within the limit of a 4% Hotel Tax; and that, in the event the 4% Hotel Tax cannot cover the cost of an underground facility, alternatives would be fully explored for a partially depressed facility with roof top use or an above ground facility. (The convention center is being designed as a depressed structure. The design and feasibility of a theme park (recreational/entertainment park) is being investigated by the Redevelopment Agency, and such a use is included in Alternative B.)

12. That the exhibit hall be located in the block bounded by Howard, Folsom, Third and Fourth Sts. (This is the selected site, which is included in Alternatives A and B.)

13. That, in the event that a policy statement on the exhibit hall is approved by the voters, the Mayor take immediate legislative action to increase the hotel tax to 8% with the present 2% and the added 2% for a total of 4% being reserved solely for the purpose of financing the construction of the exhibit hall. (The intended increase in the hotel tax has not yet been enacted by the Board of Supervisors.)

14. That the urban park in the central blocks be financed in order of preference by (1) a private developer, (2) lease revenue bonds supported by commercial uses within the park or (3) other appropriate means excluding Proposition J (open space and park

acquisition) funds. (Studies are under way by the Redevelopment Agency to determine the economic feasibility and programming of such a facility.)

15. That an appropriate pedestrian connection be constructed to unite the three central blocks on either side of Howard and Mission Sts. between Third and Fourth Sts. (A pedestrian concourse is included in Alternatives A, B, and C.)

16. That institutional and community uses be considered for the remainder of the sites; and that a site be reserved for a downtown high school as close as possible to the South-of-Market campus of the San Francisco Community College. (Specific decisions have not been made in this regard.)

17. That the Board of Supervisors approve the proposed plan change for provision of up to 50 units of market-rate housing on the top of the apparel mart. (The commitment to the Redevelopment Agency by the developer of the apparel mart includes 50 units of market-rate housing. This housing is included in Alternatives A and B.)

FOOTNOTES

/1/ Comments on the status of the recommendations as of December, 1977 are in parentheses after each recommendation.

APPENDIX C: AVAILABLE SOCIAL SERVICES SOUTH-OF-MARKET DISTRICT, July 1977

Organization	Type of Service	Area of Coverage	Location
Clementina Towers	Recreation, Counseling	S-O-M	320 Clementina St.
Alexis Apartments	Recreation, Counseling	S-O-M	390 Clementina St.
Silvercrest Residence	Recreation, Health, Hot Lunch Programs	S-O-M	133 Shipley St.
Medi-Cal	AFDC	S.F.	965 Mission St.
South of Market Health Center	General Medical Services	S-O-M	551 Minna St.
S.F. Department of Public Health	VD Clinic	S.F.	250 Fourth St.
Golden Gate Regional Center for Developmentally Disabled	Developmentally Disabled	West Bay	346-9th St.
San Francisco Coalition	Affirmative Action	S.F.	693 Mission St.
S.F. District Attorney	AFDC Family Support Bureau	S.F.	814 Mission St.
Fort Help	Crisis Intervention	S.F.	169-11th St.
S.F. Gospel Rescue Mission	Religious, Food, Shelter	S-O-M	221-6th St.
Lifeline Mission	Religious, Food, Shelter	S-O-M	917 Folsom St.

Oliver House	Alcoholic Recovery House	S-O-M	80-9th St.
Goodwill Industries	Disabled Employment Training	S.F.	980 Howard St.
Stepping Stone	Religious, Food, Shelter	S.F.	255-10th St.
Utility Workshop	Employment & Training	S.F.	1118 Howard St.
South Park Community Center	Multi-Purpose	S-O-M	164 South Park St.
St. Patrick's Church	Religious, Housing, Daycare, Food	S-O-M	756 Mission St.
S.F. Red Shield Community Center	Recreational	S.F.	95 McCoppin St.
S.F. Senior Activities Drop-In Center	Recreational, Food	S-O-M	360-4th St.
Catholic Social Services	Counseling	S-O-M	Chinatown 785 Market St.
Adult Vocational Program	Transitional sheltered workshop for mentally retarded adults	S-O-M	657 Harrison St.
Asian American Mental Health Training Center	information not available		150 8th St.
Canon Kip Community House	Recreation and lunch programs for senior citizens, special transportation services, community outreach and organization, youth education programs	S-O-M	705 Natoma St.
Central City Head Start	information not available		360-5th St.

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Community Streetwork Center	Pre-delinquency prevention and job training	S-O-M	699 Mission St.
Legal Aid Society	Legal Counsel and Referral	S.F.	693 Mission St.
Department of Social Services	Food stamp distribution	S.F.	1360 Mission St.
South of Market Filipino-American Neighborhood Association	information not available		543-A Natoma St.
Filipino Education Center	Education (K-6), screening & school placement (K-12), job referral and community activities for immigrants.	S.F.	824 Harrison St.
Filipino Organizing Committee	information not available		51 Russ St.
Filipino Youth Coordinating Committee	Work experience program, tutoring, counselling, court liaison for youth aged 14-18	S.F.	944 Market St.
Economic Opportunity	Job counselling, housing, immigration, child care, food supplements for mothers of infants	S.F.	1173 Mission St
Harriet Street Center	Alcoholism treatment, adult day recreation, counselling, court liaison	S-O-M	245 Harriet St.
John O'Connell Automotive School	Automotive job training	S.F.	765 Harrison St.
Neighborhood Legal Assistance	Civil legal assistance for low-income persons	S.F.	532 Natoma St.

Northeast Community Mental Health	Mental health services	S-O-M	450-6th St.
Open Road	Career workshops and counselling for out-of-school youth ages 16-21	S.F.	149-9th St.
Phoenix Corporation	information not available		164 South Park St.
Rehab.	information not available		1198 Howard St.
St. Patricks Day Care	Full day program for children ages 3-6 with low-income working parents	S.F.	366 Clementina St.
St. Vincent de Paul Ozanam House	Alcoholic detoxification	S.F.	1175 Howard St.
Salvation Army Harbor Light Mission	Alcoholic detoxification and rehabilitation	S.F.	1275 Harrison St.
Salvation Army Senior Activity Center	Health screening, recreation, counselling, referral, classes for senior citizens	S-O-M	360-4th St.
S.F. Pretrial Diversion Project	Workshops, tutoring, basic education, job referral, etc. for adults referred from courts	S.F.	739 Bryant St.
Southeast Asian Refugee Resettlement	Vocational training, job referral, social services, youth programs for Vietnamese, Laotian, and Cambodian refugees	S.F.	944 Market St.
Tenants and Owners Development Corporation	Development of housing for the elderly	S-O-M	133 Jessie St.

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Big Brothers of San Francisco	Relationship with adult males for fatherless boys	S-O-M	693 Mission St.
Sickle Cell Anemia, Inc.	Research	S-O-M	693 Mission St.
San Francisco Community Street Work Center	Job training for youth	S-O-M	699 Mission St. 109 Third St.

Sources: San Francisco Department of Social Services, Resource Directory, June 1977; Salvation Army; San Francisco Housing Authority; San Francisco Catholic Social Services; and agencies listed.

APPENDIX D: ECONOMICS

1. BASIS OF ESTIMATED NEW PERMANENT EMPLOYMENT, 1980 & 1988, USED IN TABLES 34 AND 35, PAGES 255 AND 256, RESPECTIVELY.

The factors used to estimate the permanent employment in the project area (Table 34, page 255) are as follows:

Office: 1 employee per 250 sq. ft. of floor space, plus 1 maintenance employee per 20,000 sq. ft.

Retail: 1 employee per 800 sq. ft. of floor space.

Apparel Mart: 1 employee per 1,000 sq. ft. (wholesale only).

Light Industrial: 1 employee per 500 sq. ft.

Convention Center: See (new) Appendix D.4.

Commercial Recreation (indoors): 1 employee per 600 sq. ft.

Recreation/Entertainment Park: 92 employees per acre.

Hotel: 1 employee per 1.4 rooms.

Public Parking: 1 employee per 170 parking spaces. (1 space = 350 sq. ft., including circulation areas.)

Pedestrian Concourse and City Park: 0.75 employee per acre (43,560 sq. ft.).

Source of Estimated Occupation Groups, 1980 & 1988 used in Table 35, page 256:

Estimated permanent YBC employees, by occupation groups shown in Table 35, were based on the figures shown in Appendix D, Table D-1, and were derived from the following sources:

- San Francisco Department of City Planning, June, 1975. Labor-Force Trends.
- Arthur D. Little, Inc., June 1975, Commercial and Industrial Activity in San Francisco, Present Characteristics and Future Trends.
- Richard Gryziec, July, 1977, Yerba Buena Center Pleasure Park. Available at Department of City Planning.

APPENDIX D, TABLE D-1

ESTIMATED PERCENTAGE OF PERMANENT EMPLOYMENT, BY LAND USE TYPE, YERBA BUENA CENTER

OCCUPATION GROUPS	OFFICE	RETAIL	LIGHT INDUSTRY	CONVENTION CENTER	REC./ENT. PARK	HOTEL
PROFESSIONALS	20					
MANAGERS	15	10	5	5		1
CLERICAL	40		10	10	10	40
SALES WORKERS	10	69		5	50	
CRAFTSMEN & FOREMEN			13	15		
BUILDING ENGINEERS			65		25	
TRANSPORT		1	1			
LABORERS		1		10		
SERVICE WORKERS	15	20	5	55	15	59

2. EMPLOYMENT TRENDS

Between 1965 and 1970, the South-of-Market area as a whole experienced an 18% increase in employment. Most of the growth was accommodated in buildings located east of Third St. between Market and Folsom, outside the YBC area. Wholesale trade and government activities declined, while contract construction, communications, and services experienced growth. Table D-2 presents 1965-1970 employment trends for the South-of-Market area by major types of industry groups. South-of-Market employment increased by 18% while San Francisco's total employment increased by 12%. The South-of-Market area reflects citywide trends of increases in total employment. While employment increased in the South-of-Market District as a whole, it declined within the YBC area between 1965 and 1970,/1/ as some wholesaling, warehousing, and manufacturing uses were displaced.

Since 1970, new construction in YBC has increased employment to 4,600 (See Table 34, page 255, main EIR text). The large number of

employees in the communications industry--3,580 persons--reflects the Pacific Telephone Company buildings which have been constructed since 1970. The American Telephone and Telegraph Company is expected to add another 800 persons to the total when its long-lines building is completed by the end of 1977. Other industries with relatively high employment in the YBC area include business and repair services.

The South-of-Market resident employment declined from 4,000 to 3,150 between 1960 and 1970. However, the percentage of unemployment among the South-of-Market residents during the same period remained about the same: 16-17%. Table D-3 presents employment patterns of South-of-Market residents for 1960 and 1970. Service workers predominated among South-of-Market residents in both years. Transport, clerical, and professional categories were the only groups to increase during this period.

The employment patterns of South-of-Market residents mirror the citywide trend toward service and clerical employment. The increase in service employment (which showed a 4% increase but a decline in total number), clerical employment and transport employment percentages, and the drop in both craftsmen and operatives percentages probably reflects the general citywide change in job opportunities from industrial to services and white collar jobs.

APPENDIX D, TABLE D-2

EMPLOYMENT PATTERNS IN THE SOUTH-OF-MARKET AREA*, 1965 and 1970

	1965		1970		
INDUSTRY GROUP	Number	Percent	Number	Percent	Change
Agriculture, Forestry, Fisheries, and Mining	20	0.02	760	0.6	740
Contract Construction	710	0.7	9,760	8.3	9,050
Manufacturing	20,080	20.2	20,950	17.8	870
Transportation, Communications, and Utilities	19,980	20.1	24,610	20.9	4,630
Wholesale Trade	14,830	14.9	10,130	8.6	-4,700
Retail Trade	9,350	9.4	11,150	9.5	1,800
Finance, Insurance, and Real Estate	4,480	4.5	7,390	6.3	2,910
Business and Repair Services	7,280	7.3	7,040	6.0	- 240
Other Services	8,380	8.4	12,170	10.3	3,790
Public Administration and Government	14,410	14.5	13,730	11.7	- 680
TOTAL	99,520	100.0	117,690	100.0	18,170

*Area generally bounded by Market St., The Embarcadero, Townsend St. and Eleventh St.

SOURCES: Data on employment by area and by type for 1965 were obtained from reports and printouts of the Bay Area Transportation Study Commission (predecessor to the Metropolitan Transportation Commission) derived from data furnished by the California Department of Economic Development. Data on employment by area and type for 1970 were derived by Arthur D. Little, Inc., from information in the U.S. Census of Population and Housing and contained in special computer runs furnished by the Metropolitan Transportation Commission. (1973 YBC EIR.)

APPENDIX D, TABLE D-3

EMPLOYMENT PATTERNS OF SOUTH-OF-MARKET RESIDENTS, 1960 and 1970

	1960 No.	Percent of Total Employment	1970 No.	Percent of Total Employment
Professionals	176	4%	185	6%
Managers	239	6%	142	5%
Clerical	604	15%	629	20%
Sales Workers	192	5%	90	3%
Craftsmen & Foremen	560	14%	298	9%
Operatives (Building Engineers)	589	15%	313	10%
Transport	-	-	144	5%
Laborers	462	12%	327	10%
Private Household Workers	71	2%	30	1%
Service	1,112	27%	996	31%
TOTAL	4,005	100%	3,154	100%

SOURCE: U. S. Census, 1960 and 1970.

3. OFFICE SPACE TRENDS IN SAN FRANCISCO

At present, San Francisco provides over 47 million gross sq. ft. of downtown office space. Of this amount, 35.7 million gross sq. ft. is in major downtown buildings of ten stories or more. In the ten years from 1950 to 1959, ten major office buildings averaging 13 stories and 240,000 gross sq. ft. were constructed. In the ten-year period from 1966 to 1975, 30 major office buildings were constructed averaging 29 stories and 566,000 gross sq. ft. With the trend towards larger, and more space- and energy-efficient buildings, the demand for future office space may be highly dependent upon the availability of cleared land zoned for the highest allowable density. According to estimates by the Department of City Planning,/2/ the financial and administrative district (C-3-0 zoning district), which allows the highest floor area ratios in the City, has a theoretical capacity to accommodate 30+ million sq. ft. of new office space,

in addition to the 6+ million sq. ft. available in YBC. Even if site clearance or parking requirements reduce this theoretical capacity in half--to 15 million sq. ft. --the 6+ million sq. ft. in YBC, and this 15 million sq. ft. in other parts of San Francisco, represent a 21-year supply of available high-density office space within the downtown district and YBC at recent absorption rates (1,000,000 sq. ft. per year).

As pointed out in the Arthur D. Little report to the San Francisco Department of City Planning in 1975:

> "These facts suggest the possible desirability of restraining growth north of Market Street in order to accommodate new growth on land already prepared for development in the YBC project area. This strategy would reduce the necessity for demolition and reconstruction in the downtown, and maximize the fiscal benefits derived from construction of new buildings on vacant land."/3/

● Closely related to office space absorption is the matter of net or marginal permanent jobs resulting from new office and retail facilities in YBC, and the net economic and fiscal impact of the YBC project as a whole. If City agencies are able to aggressively market YBC land to corporations on a regional, national or international basis by means of favorable land prices, off street public parking, and other incentives, then new YBC facilities could generate a positive new stimulus on the City's employment, retail trade and tax base. If, on the other hand, YBC's office and retail space is gradually filled with existing San Francisco firms who are upgrading their facilities and providing for normal growth (which would have occurred elsewhere in San Francisco anyway), then employment, retail trade, and tax base additions within YBC would be largely subtracted from vacated or undeveloped facilities in other locations within San Francisco, with diminished net positive effects upon the City's economy.

From a fiscal point of view, the shifting of San Francisco based firms from older downtown quarters to new facilities in YBC could have a negative effect, because vacated older structures could continue to require police, fire, and public works expenditures, while commanding lower rents and assessed values. Newly constructed office structures within YBC would also require additional police, fire and public works expenditures, but their property tax revenues--rather than being used for City and special district general fund purposes--might be used to pay principal and interest on YBC bonds for funding public improvements within the YBC project area.

A single highrise corporate headquarters structure, at current average sizes of 500,000 to 800,000 sq. ft. of floor area, could account for the entire projected growth in citywide office space for one year. An out-of-state corporation moving to San Francisco could be expected to bring with it employees willing to relocate, and to hire local residents to fill vacancies caused by former employees unwilling to relocate. Intracity movement of corporate offices to YBC would not be expected to generate many "net" jobs. Net, or marginal, YBC jobs are created by individuals and corporations who would not have located in San Francisco without the convention center and other YBC attributes.

The 1973 EIR did not fully address the issue of net office employment from YBC. The Arthur D. Little firm, consultant for that study, assumed that all new office space in YBC would have located in the City anyway, creating no net or marginal income in office jobs, and with no net increase in the local property tax base. In contrast, Arthur Felton and Norman Rosenstein, in their 1973 report which evaluated the 1973 EIR, derived a mathematical model/4/ which estimated "net" new office employment in YBC at 56% of total YBC office employment.

Because the actual composition of new office jobs would depend upon the type of office structure, ownership, regional origin, and hiring policies of owners and tenants, precise calculation is impossible. Clearly, however, City agencies, through economic development, corporate recruitment, and zoning policies, can influence this element to a large extent.

4. (REVISED APPENDIX D.4) REPORT ON CONVENTION CENTER MARKET DEMAND AND OPERATIONS

CONVENTION CENTER MARKET FACTORS

San Francisco has a reputation as one of the most attractive tourist and convention cities in the United States, and in the world. The City's unusual topography, ethnic mix, tourist attractions, moderate climate, and dining and hotel accommodations, have endeared it to travelers thoughout the world. Recent studies by the San Francisco Convention & Visitors Bureau indicate that most conventioneers (approximately 73%) bring their spouses to San Francisco conventions; a majority either arrive a day or two early or leave a day or two after attending meetings or conventions. The San Francisco Convention and Visitors Bureau estimates that the average convention delegate spends approximately $75 per day, and stays 4.5 days--for an average expenditure of approximately $338 per visit.

State, regional, and national groups account for approximately 85% of all groups arriving in the city for conventions, according to surveys conducted by the Convention and Visitors Bureau.

CONVENTION DESIGNATION	PERCENT
International	1.5%
National	35.8
Regional	34.2
State	14.9
District	9.9
Trade (Local)	3.7
TOTAL	100.0%

San Francisco's market share of total San Francisco Bay Area convention activity is shown in Table 1. San Francisco, in 1976, captured approximately 56% of Bay area conventions, and approximately 66% of Bay area convention delegates. Oakland, San Mateo County and San Jose attracted smaller sized conventions--as indicated by the fact that their share of delegates was less than their share of total conventions.

TABLE 1: BAY AREA CONVENTION ATTENDANCE 1976

COMMUNITY	CONVENTIONS		DELEGATES	
San Francisco	878	(56%)	753,785	(66%)
Oakland	165	(11%)	60,000	(5%)
San Mateo County	224	(15%)	142,200	(13%)
San Jose	277	(18%)	180,000	(16%)
	1,544		1,136,000	

SOURCE: Lord & Leblanc;
San Francisco Convention & Visitors Bureau.

Table 2, on the following page, shows total conventions, convention attendees, convention delegate expenditures, and tourism expenditures for the years 1965 to 1976, which was the last year for which tax return data has been tabulated, and compiled.

During the eleven year period shown in Table 2, there was a 4% average annual growth (non compounded) in the total number of conventions held in San Francisco. In 1967, 1969, 1970, and 1971, San Francisco experienced a net decrease in the number of conventions it hosted below the previous year's total. This occurred again in 1976, when there was a decrease of 10 conventions, from the total of 888 conventions which were hosted in 1975.

Total convention delegates, over the eleven year period from 1965 to 1976, increased at an annual average rate of 8%. In 1969, 1971, 1972, and 1975, the total number of convention delegates meeting in San Francisco declined from the previous year's level.

Convention delegate expenditures in San Francisco--an important economic factor in the City's economy, since the vast majority of delegates are from out of town and are spending "new money" which is not subtracted from other expenditures within the City--increased at an average annual rate of 21% during the 1965-1976 period, according to the San Francisco Convention and Visitors Bureau statistics. Total convention delegate expenditures in San Francisco dipped in 1969, 1970, and 1971, below the levels experienced in 1967, and 1968; this decline amounted to an 8% to 12% decline in delegate expenditures below previous levels. Although the average annual growth rate in convention delegate expenditures from 1965 to 1976 was 21%, the growth rate between 1965 and 1971 was only 6% per year, non compounded. Since Brooks Hall was constructed in 1958, with approximately 100,000 net square feet of exhibition space, and Civic Auditorium was completely remodeled in 1964, the relatively slow rate of annual growth in convention delegate expenditures between 1965 and 1971 cannot be traced to a lack of first rate new convention hall space, but rather, has been frequently attributed to the lack of quality hotel rooms and hotel convention facilities prior to

1971, and to the lack of convention halls having more than 100,000 net square feet of exhibition space.

From 1967 to 1976, total tourism expenditures increased at an average annual rate of approximately 25%; convention delegate expenditures over this same period ranged from 37% to 48% of total overnight tourism expenditures.

TABLE 2: CONVENTIONS & ATTENDEES, CITY OF SAN FRANCISCO, 1965-1976

YEAR	TOTAL SF CONVENTIONS	TOTAL CONVENTION DELEGATES	CONVENTION DELEGATE EXPENDITURES	TOTAL TOURISM EXPENDITURES[1]	CONVENTION EXPENDITURES AS PERCENT OF TOTAL TOURISM EXPENDITURES
1965	601	411,045	$ 76.0 mil.	$178.0 mil.	43%
1966	688	509,045	96.7	201.5	48%
1967	*684	514,876	112.8	234.3	48%
1968	740	527,528	115.7	243.5	48%
1969[2]	*679	*480,259	*101.4	262.0	*39%
1970	*646	488,884	108.0	267.5	40%
1971	*593	*470,300	*103.3	272.7	*38%
1972	694	597,700	141.6	312.7	45%
1973	787	*568,308	142.5	369.1	*39%
1974	851	718,871	202.5	430.0	47%
1975	888	*676,576	204.0	554.0	*37%
1976	*878	753,785	248.0	661.0	38%
1981 EST.	1,010 EST.	979,921 EST.	446.4 EST.	1,255.0 EST.	37% EST.
ANNUAL AVERAGE GROWTH, non compounded over 11-year period (1965-1976)	4 %	8 %	21 %	25 %	(1%)

*Denotes year in which there was a decline from the previous year.
[1]Includes only those tourists who remained overnight in a hotel/motel.
[2]SF Convention & Visitors Bureau cautions that figures after 1969 were tabulated by computer and may not be entirely comparable with data for previous years.

SOURCE: San Francisco Convention & Visitors Bureau; Lord & LeBlanc

Table 2 does not give an indication of the demand for public exhibit space; for although total delegates visiting San Francisco have increased an average of 8% per year since 1965, and delegate spending has increased an average of 21% per year, much of this annual increase is captured by exhibit space in private hotels. This fact was pointed out in the 1973 EIR on p. V-A-81:

> "A majority of the conventions between 1960-1970 were held in the various large hotels which have meeting rooms and banquet halls in addition to lodging accommodations. For example, in 1967, only 19 of the 684 conventions held in the city required exhibit space. In 1968, only 15 out of the 740 held, required exhibit space larger than could be provided by hotels. However, to avoid a misimpression, 15-19 conventions requiring exhibit space can comprise a delegate number of 180,000-200,000."

Published data on total United States convention experience is both scarce and subject to reporting error. Some cities, in their tabulations of "scheduled" conventions include only those conventions requiring 50 or more rooms of hotel space; some cities include annual meetings of corporate stockholders, some do not; some cities do not report their convention activity at all.

Data compiled by World Convention Dates suggests that between 9,000 and 12,000 scheduled conventions are held in this country each year. Roughly half of these scheduled conventions, or 4,500 to 6,000, require exhibit space, and only 6% of those requiring exhibit space (3% of total conventions) require exhibit space of between 50,000 and 250,000 net square feet--the space which will be available in the proposed YBC facility. (Which will have approximately 225,000 net square feet of space in the main exhibit hall, and two sliding partitions which will allow the main hall to be divided into three smaller units, the smallest of which is proposed to be approximately 50,000 net square feet in size.)

The YBC exhibition hall facilities will therefore be focusing on approximately 3% of the total U.S. convention industry, or from 270 to 350 total U.S. conventions each year.

If Brooks Hall's exhibition facilities are put into the equation, the total U.S. market share is reduced even further, because Brooks Hall has approximately 100,000 net square feet of exhibition space. The total U.S. demand for exhibition space above 100,000 net square feet is estimated by World Convention Dates to be 1.5% of total U.S. convention business, or 135 to 180 conventions per year. The YBC exhibition facility, if it intends to capture a share of the national market for exhibition space above 100,000 net square feet (and not compete with the 100,000 N.S.F. offered by Brooks Hall), should therefore attract and hold on some annual sustainable basis, a market share of a total national market of 135 to 180 large conventions.

Table 3 shows the relationship between exhibit space requirements of U.S. registered conventions, and the size, in terms of delegates attending U.S. conventions.

TABLE 3: EXHIBIT SPACE NEEDS FOR CONVENTIONS BY NUMBER OF DELEGATES

NUMBER OF DELEGATES	EXHIBIT SPACE REQUIREMENT (Square Feet)
Fewer than 250	1,000 - 20,000
250 - 499	1,000 - 70,000
500 - 999	1,000 - 80,000
1,000 - 1,999	2,000 - 90,000
2,000 - 2,999	3,000 - 100,000
3,000 - 3,999	3,000 - 120,000
4,000 - 4,999	3,000 - 150,000
5,000 - 9,999	5,000 - 160,000
10,000 - 19,999	7,000 - 200,000
20,000 and over	8,000 - 320,000

SOURCE: Directory of Trade & Industrial Shows; Lord & LeBlanc

Published reports on conventions held throughout the United States indicate that approximately 84% of total scheduled conventions had fewer than 1,000 delegates; 10% had between 1,000 and 3,000 delegates, and 6% had more than 3,000 delegates. San Francisco in 1977 experienced a distribution of total conventions by size which was almost identical to the United States distribution./1/

Table 2 has displayed 11 years of San Francisco convention experience. If past growth rates are used to project the number of conventions visiting San Francisco in 1981, the first year that the new YBC facility would be open for convention business, then approximately 1,010 conventions, and approximately 979,921 total delegates could be expected to visit San Francisco in 1981.

When these total estimated San Francisco convention delegates are broken down by convention size, using published national ratios discussed above, the following size distribution could be anticipated:

ESTIMATED 1981 CONVENTION SIZE, CITY OF SAN FRANCISCO

Size	Ratio	Conventions	Delegate Registrants	Average Delegate Number
Fewer than 1,000 registrants	84%	848	352,768	416
1,00 to 3,000 registrants	10%	101	163,620	1,620
3,000 and above registrants	6%	61	463,533	7,598
All Conventions	100%	1,010	979,921	970 (Grand Avg.)

Applying the 1.5% ratio of total U.S. conventions requiring exhibition space of the size being offered by the proposed YBC facility (in excess of Brooks Hall capacity) to the total 1981 San Francisco conventions projected above (1,010 conventions in 1981) results in a further breakdown of the 3,000 and above category of convention registrants as follows:

Size	Ratio	Conventions	Delegate Registrants	Average Convention Size
3,000 and above requiring YBC-type exhibit space (more than 100,000 net square feet)	1.5%	15	195,000 Est.	13,000 Est.
3,000 and above requiring less than 100,000 net square feet (Brooks Hall & other facilities)	4.5%	46	268,533 Est.	5,838 Est.
TOTAL	6.0%	61	463,533	7,598

From these projections, it is estimated that approximately 15 of the largest conventions could be expected to use the YBC exhibition facilities in 1981, without interfering with the 100,000 net square feet of exhibit space in Brooks Hall. An estimated 46 other large conventions could be expected to use Brooks Hall and other exhibit facilities (shown in Table 4), in 1981. The 15 conventions requiring more than 100,000 net square feet of exhibit space could have an average size of some 13,000 delegates, the 46 conventions requiring less than 100,000 N.S.F. could have an average delegate count of some 5,800 registrants.

The new and modern facilities offered by the proposed YBC exhibition complex may attract many conventions that could be accommodated in the space offered by Brooks Hall. If the YBC facilities are constructed, it may prove difficult to persuade many convention managers to use the Brooks Hall / Civic Auditorium complex. Rental rates for the Brooks Hall complex will be less than for the proposed YBC hall, but in the initial years at least, many convention managers requiring less than 100,000 square feet of exhibition space may prefer to pay higher rents in order to use the newer, more interesting and convenient YBC facilities. Although private convention center managers have considerable latitude in scheduling only the most desirable or profitable conventions for their facilities, a manager of a public convention facility must schedule on a first come-first serve basis, and smaller convention sponsors, willing to pay higher YBC rental rates, could create bottlenecks in the operation of the YBC complex, and vacancies in the Brooks Hall / Civic Auditorium complex which would not appear likely strictly on the basis of market support for the combined facilities.

TABLE 4: EXISTING BAY AREA NON-HOTEL MEETING AND EXHIBIT FACILITIES

FACILITY	Usable Exhibit Floor Space (Sq. Ft.)	Exhibit Booth Capacity (Number)	Seating Capacity	Approximate Rental, Full 24-Hr. Day[c]
Civic Auditorium:				
Main Arena	32,600	186	8,000[b]	$1,000-1,500
Polk Hall	7,600	43	500-900[a]	$150-300
Larkin Hall	7,600	43	500-900[a]	$150-300
Brooks Hall	90,000	500	4,000-5,000[a]	$1,000-1,200
War Memorial Opera House	N/A	N/A	3,250	$1,350-2,100
Veterans Memorial Building	N/A	N/A	1,600	$450-550
Masonic Auditorium	16,500	128	3,165	$1,100-1,500
Cow Palace:				
Main Arena	43,000	100	10,000[b]	$1,500-2,500
Exhibit Hall (North)	49,000	280	7,000[a]	$750
Exhibit Hall (South)	49,000	280	7,000[a]	$750
Exhibit Buildings (Lower)	126,000	700	10,000[a]	$1,000-1,200
Candlestick Park	N/A	N/A	61,000	$5,000-6,000
California Academy of Sciences	N/A	N/A	400	
Hall of Flowers	14,000	80	2,700	$210-550
Kezar Stadium	N/A	N/A	58,900	$500-3,000
Winterland	8,000	50	5,400[b]	
Curran Theater	N/A	N/A	1,770	
Longshoreman's Auditorium	N/A	N/A	2,220	
California Hall	N/A	N/A	1,250	
Palace of Fine Arts Theater	5,400	30	1,000	
Japan Center Theater	9,200	50	850	$350-1,000
Scottish Rite Auditorium	N/A	N/A	700	
International Center	N/A	N/A	776	
Other Bay Area Locations				
Oakland-Alameda County Coliseum	120,000	686	14,000 Arena 54,000 Stadium	
San Jose Convention & Exhibit Hall (under construction)	30,000	170	3,300[a]	$1,100-1,500
San Jose Center for the Performing Arts	N/A	N/A	2,700[a]	$380-600
San Jose Civic Auditorium	9,300	50	3,300[b]	$900-1,200
Miscellaneous Meeting Rooms	17,200	95	2,800[a]	$90-225
Marin Civic Theater	23,000	130	2,000[b]	$450

[a] Removable seating on one level.
[b] Combination of removable seating and permanent seating.
[c] Blank spaces--information not available.

Whether or not the proposed YBC complex can attract 15 of the largest U.S. conventions requiring the largest amount of exhibit space, on an annual sustaining basis, out of a total U.S. market having only 135 to 180 conventions of this type each year, is the key issue to any decision on whether or not the center should be built, and whether or not it, in a combination with Brooks Hall, will prove to be a financial benefit or a financial drain on San Francisco's municipal and tourist industry budgets.

The most obvious method of determining if the proposed YBC exhibition facility can capture roughly 10% of the total of 135 to 180 of the largest U.S. conventions requiring 100,000 to 250,000 square feet of exhibit space--would be to ask the 135 to 180 associations sponsoring these conventions if they will use the YBC facilities, if so, how often, and how many delegates and use days would be contemplated. A survey of this type could be best validated by asking the trade association managers who respond affirmatively to the survey to book space in the proposed YBC facility. Although such a survey sounds relatively easy to conduct, a valid survey of this type cannot be conducted and validated, until a preliminary design for the proposed facility has been worked out, and some assurance can be given to prospective facility users, that the convention center will in fact be built. Although comprehensive surveys were conducted in 1972 to determine annual total demand for the earlier YBC Exhibition and Sports Arena complex, no valid recent surveys of this type currently exist on the present YBC exhibition facility.

The San Francisco Convention and Visitors Bureau has conducted a recent survey which purports to show that over a five year period, some 53 association managers have indicated that they would hold their conventions in San Francisco only if the YBC hall is built. Some of these association managers have already booked space in the proposed facility. A survey of this type is absolutely critical in any analysis of the "net" or "marginal" effect of the proposed new center on new jobs and income in the San Francisco tourist industry. Unfortunately, this Convention and Visitors Bureau survey appears to be incomplete in several areas: a) It asks various association managers if they will hold their conventions in San Francisco during the next five year period, but it does not ask how frequently each association holds conventions. (One meeting in the next five years, not to be followed by another meeting for ten years, would not provide a sustaining demand for YBC space); b) It fails to ask how much exhibit space would be required and how many use days would be required; c) Many of the associations responding to the survey represent organizations having 10,000 or fewer delegates (30 out of the total of 52); unless these associations have an inordinate requirement for exhibit booth space, their space requirements might be met by private hotel construction or other convention center construction in other Bay area or regional locations before the proposed YBC center is completed.

Recognizing that additional survey work must be done to validate: 1) Total annual sustainable demand for the proposed facility (to determine profitability and justification for the facility vis a vis Brooks Hall / Civic Auditorium); and 2) Total "net" or new demand for YBC Exhibit facilities, by those convention managers who will not come to San Francisco unless the YBC hall is built (to determine the number of new delegates, new tourist spending and the entire issue of "off site" tourism jobs and payroll income to San Francisco)--a "worst case" and "best case" scenario can be developed.

The "best case" scenario will be largely based on survey work already done, and the 1981 projections discussed earlier in this report, and will be founded on the fact that many convention managers consider San Francisco to be one of the best convention cities in the nation. The ten features most often cited by convention managers as promoting a successful convention area are: 1) a good supply of nearby "quality" hotels; 2) year around cultural attractions; 3) centralized location in terms of scheduled air routes and proximity to a portion of association membership; 4) scenic beauty; 5) good retail facilities; 6) moderate climate; 7) an international reputation or image ("snob appeal"); 8) availability of reliable local transportation; 9) a safe day and night environment; and 10) adequate convention facilities./2/

The "worst case" scenario is largely based on the difficulty in validating existing survey data, the national trend among certain professional organizations/3/ toward holding smaller conventions of specialists and sub-specialists, and the large number of new convention centers currently being planned throughout the country--a trend which could dilute the total annual convention business in each city having a major convention center, and could lead to severe price or non price competition among a large number of marginally successful convention centers in order to attract a larger share of a very narrow market./4/ With only 135 to 180 of the nation's largest conventions requiring exhibit space of 100,000 to 250,000 net square feet each year, and with a requirement of "capturing" roughly 10% of this market each year, in order to meet current assumptions on annual use and operating revenues and costs, then San Francisco must capture one convention in 10 each year, or to put it another way, San Francisco might only be able to allow itself the luxury of having nine other cities in the nation which are as attractive as it is, in terms of the ten features most often cited by convention managers as promoting a sucessful convention.

Operationally, the Brooks Hall / Civic Auditorium complex, and the proposed YBC Exhibition facility should be considered to be complementary facilities. Attempts to improve the profitability of YBC, by broadening the market base and seeking smaller sized conventions, could decrease the Brooks Hall market share, and decrease the Brooks Hall profitability, with no net effect on the combined operating revenues (losses) of the two facilities. This effect would be moderated to the extent that conventions with calendar constraints, which presently may be turned away, would have a broader range of convention/exhibit space to select from within San Francisco.

EXHIBIT HALL MARKET SURVEYS

The most comprehensive survey of market demand for YBC exhibition space was conducted in 1972 by McCue, Boone, Tomsick; Robert Sullivan; and John McGillis. Questionnaires were sent to major firms, trade associations, and exhibitors of all types throughout the United States, asking how often previously planned YBC exhibit facilities would be used, estimated out of town and local attendance, exhibit area needed in square feet, show days required, and total use days required.

Of the 63 associations who responded in a positive manner to the survey(s), five associations (28 show days) were planning to use the facility once a year or more often; six associations (22 show days) were planning to use the facility once every two years; 26 associations (200.5 show days) were projected to use the facility once in five years; 21 associations (85 show days) once in ten years; three associations (13 show days) once in 20 years; two associations (8 show days) once in 50 years.

Of the 63 associations who responded, six were deemed to require exhibit space considerably in excess of the 350,000+ square feet planned for YBC in 1971.

When the McCue survey data was annualized by Lord & LeBlanc (this involves dividing the survey responses, by the convention rotational cycle, to get average usage data per year), certain annual usage patterns could be inferred. The conclusions to be reached from the 1971 McCue, Boone & Tomsick et al. surveys would seem to be, that over an extended period, YBC could expect, on an annual sustainable basis, an average of 15 major associations or trade shows having an average of 208,400 out-of-town delegates and 289,085 local visitors. Delegates would use the YBC exhibition facilities an average of 164 days each year, with 67 of those days actual show days, and 98 days used for setting up and taking down exhibit booths, and removing decorations and promotional material.

Based upon the results of the McCue, Boone & Tomsick et al. surveys, particularly as they related to local attendance, and average length of convention use days, and setup/take down days; and based upon projections of 1981 San Francisco delegate attendance and published data on national convention attendance, discussed elsewhere in this report, the following "best case" and "worst case" total annual YBC use estimates have been made by Lord & LeBlanc:

TOTAL ANNUAL USE	"WORST CASE"	"BEST CASE"
Conventions	12	18
Out of Town Delegates	120,000	325,000
Local Visitors	300,000	540,000
Total Use Days	132	216

CONVENTION CENTER REVENUES

Convention centers, like restaurants and hotels, tend to develop clientele and patronage, befitting their location, size and particular attractions, or structural features.

There is considerable variability in the size, behavior, and space requirements of the larger conventions and trade and visitor shows. Some daily visitor events such as the San Francisco Sports & Boat Show, which is held on an annual basis at the Cow Palace, draw many (390,000

estimated attendance in January 1978) local attendees who drive to the show, mostly from Bay area locations, spend nearly as much to park their automobiles as the price of admission ($1.50 parking, $2.50 admission in 1978), and spend little in the local economy except fast food and beverage concessions within the exhibit facilities./7/

Trade and professional conventions include large numbers of out-of-town delegates and represent the principal market sector to which the new convention center will be focusing its marketing effort, rather than daily visitor shows such as the Annual Sports & Boat Show.

The American Dental Association, for example, might have an out-of-town attendance of 20,000 to 25,000, meet in San Francisco once or twice every five years, arrive almost entirely by air, stay in overnight accommodations in local hotels, require little in the way of parking accommodations in the vicinity of the exhibit facility, and spend a great deal in the local retail economy. Catering or concession revenues to convention center management from professional conventions would vary considerably depending upon the type of convention but would likely take second billing to privately owned restaurant or hotel facilities.

Revenues to convention center operations are typically from three sources: rental of space; concessions; and parking.

Rental of space: Rental rates can vary depending upon whether the event is held by a profit, or non-profit organization; whether the event is a sit-down function such as a sporting event or a concert where admission is charged, or an exhibition or trade show, where floor space for booths is required rather than seating space for spectators. Rates also fluctuate depending upon whether or not a hall or arena is used in the daytime or nighttime, or for one performance per 24 hour period or more than one performance. Rates for exhibitions vary depending upon whether booths will be experiencing heavy visitor traffic on "show days", or whether the delegate or visiting public will be excluded and the space will be used by sponsors and craftsmen for set-up or take-down of booths and equipment. Set-up days may be charged at half the charge for show days.

Rental rates can fluctuate, depending upon whether an entire hall or exhibit area is used, or only a partitioned portion is used. Rents can vary depending upon whether an exhibition is charged on the basis of net square footage used, rooms occupied, or actual floorspace (footprint) of a typical 10' x 10' exhibit booth. Since an efficient exhibition facility may be able to fit only 1,200 - 10' x 10' (100 square foot booths) into an exhibit hall having a total floorspace of 240,000 net leasable square feet, actual "net, net" leasable area may be only 120,000 square feet, in a hall having twice as much floorspace. With such "net, net" leases, an exhibitor is charged only for the actual floorspace occupied by the booth, and not for aisles or open space within an exhibit hall. Rental rates will also depend upon who rents the space. A sponsor of a large trade or consumer show could typically rent an entire hall from a convention center manager, and then sub-lease booth space to individual exhibitors. Some convention center managers eliminate the middleman and lease booth space directly to the ultimate users at higher rental rates.

Some convention center managers charge fixed rates for the use of space, others charge fixed rates versus a percentage of admission fees. Many managers of privately owned and managed centers skillfully set rental rates based upon the user's ability to pay, and upon an evaluation of revenues which can be earned by the center's catering service, bar or parking lot. Since bar, parking and catering charges do not come from the pocket of the sponsor of a large show or function, a convention sponsor may decide to hold an event at a private facility which will rent him the space for a nominal fee, in return for his assurances to center operators of large profits from bar, parking or concession sales to the visiting delegates.

Convention centers owned by municipalities have far less leeway in their pricing policies, because what might be perceived as astute business pricing policies on the part of a private facility manager, could be perceived as unfair discrimination, extortion, or corruption on the part of the manager of a facility which is financed--at least in part--with taxpayers' dollars. In addition, there may be considerable pressure by San Francisco hotel associations to keep YBC rents at a low level, virtually assuring rising operating deficits each year as inflation drives up YBC operating costs.

Concession Income: A second major source of exhibit hall revenue, the income from sales of food and beverage and novelties in or around an exhibition facility, can account for from 10 to 40% of the total operating revenues of an exhibition complex. As discussed above, discounting on facilities' rental charges may be granted in order to attract groups who will spend the maximum amount on food and beverages. Approximately one-third of 63 convention center managers who are members of the International Association of Auditorium Managers reported that concessions were operated by the centers themselves. Two-thirds of convention center managers reporting stated that concessions were operated under contract, at fees ranging from 12% (Houston) to 75% (Anaheim) of net concession income./5/

Concessions will vary depending upon the type of center. Concession sales for a boat show at the Cow Palace, for instance, might be concentrated on such items as hot dogs, beer, peanuts, ice cream and soft drinks. Concession sales at a medical convention at a local hotel might be concentrated on such items as gourmet appetizers, distilled spirits, wine, and banquet meals. A private hotel which operates a 24-hour per day food service facility could be expected to earn a greater rate of return, and produce better quality food and service to visiting convention delegates, than a facility which must operate its food service on an interrupted basis. It seems possible that small conventions or exhibitions having 5,000 or fewer delegates, would prefer to hold their meetings in private hotel facilities that could assure high quality meals and beverage services, assuming that hotel meeting space was sufficient for such purposes.

Private convention-oriented hotels in the vicinity of San Francisco International Airport report a net operating profit of 15 to 20% of gross food and beverage sales. No profit estimates are available from San Francisco hotels, but similar levels could be anticipated.

Parking income: More than half (31) of the 63 convention center managers who are members of the International Association of Auditorium Managers reported that parking operations were operated by the centers themselves. Nine out of 63 center managers (14%) reported no parking facilities were a part of their centers, and the balance (23), representing 37% of managers responding, stated that parking operations were run by concessioneers. Auditorium managers reported that their licensing fees were from 52% (Tulsa) to 92% (Oakland, CA) of net parking operation profits./6/

Those convention centers with large surface parking lots on relatively inexpensive land are at an obvious competitive advantage over centers with no parking or with parking in structures. The manager of the Cow Palace reported that during the recent Sports & Boat Show (January 9-22, 1978), 6,000-space surface parking lots experienced nearly full utilization on weekends, at a rate of $1.50 per car. On an annual basis, he estimated that one-third of Cow Palace operating revenue is from parking lot fees./7/

At current construction costs, even in areas of high use and occupancy, structured parking revenues typically are barely able to pay for capital costs of parking structures, let alone provide annual operating revenues.

The Dallas Convention Center contains nearly 300,000 square feet of exhibit space which can be used for parking 523 autos when not used for exhibits. Because floor loads for automobile parking are generally less than for multi-use hall loads, such a combined use, when incorporated in a center which is located in close proximity to the downtown, could prove feasible, because full utilization of parking space could be assured during normal business hours, and evening and weekend use would be enhanced by convention-center-induced demand. Municipal parking structures can be built for $25 to $30 per gross square foot ($7,000 to $10,000 per space). The YBC facility, with approximately 600,000 gross square feet and an estimated "hard" construction cost of $82 million, is projected to cost approximately $137 per gross square foot. Clearly the economics of this mixed use approach does not lend itself to high cost underground facilities; parking would cost approximately $78,000 per car space using the Dallas efficiency ratio of 574 square feet per car, and require a parking rate of $15 per day to cover interest on debt alone.

The lack of inexpensive parking facilities in surface parking lots in the vicinity of YBC at full development would not only eliminate a major source of annual income, but also might prevent large consumer shows such as the Sports & Boat Show from using the YBC facilities, because many exhibitors at the Sports & Boat Show drive to the show from local Bay area destinations, and require inexpensive parking in the vicinity of the exhibit halls for heavy towing vehicles, boat trailers, RVs and travel trailers.

ESTIMATED YBC REVENUES

Predicting revenues for a proposed new convention facility can be a difficult undertaking because of the large number of variables discussed above. The convention consulting firm of Event & Facility Consultants of Portland, Oregon, in January 1978 evaluated the Convention and Visitors Bureau data and determined that during its first full year of operation, YBC could expect an equivalent of 95 "full hall" show days, fully chargeable at the rate of $10,000 per day with no charge for set up/take down days. This rate per square foot is approximately two to three times the equivalent "net, net" rate charged users of the Brooks Hall / Civic Auditorium facility, which has several structural design constraints such as roof support columns and low ceiling clearances. Based on these rents, and 95 full hall show days, the Portland convention consultants have predicted first year annual rental revenues for YBC to be $1,045,000 in 1977 dollars./8/

The consultants have then compared these annual rental revenues with four similar convention facilities: The Georgia World Congress Center in Atlanta (which opened in 1976); the Los Angeles Convention-Exhibit Center; Dallas Memorial Auditorium and Convention Center; and the Anaheim Convention Center. Revenues for these four centers, according to the consultants, averaged $1,121,682 in 1976-77./8/

The convention center consultants stated that 10% of the rental revenues projected for the first year of operation would be from non-convention use of YBC (daily use public visitor shows, etc.)./8/

Catering revenues for YBC have been projected by the consultants at $250,000 for the first year of operation of YBC with an 8% increase each year thereafter.

No parking revenues have been anticipated.

Total operating revenues have been projected for YBC at $1,295,000 for the first full year of operation (in 1977 dollars).

In discussion by Lord & LeBlanc with Event & Facility Consultants, the convention consultants pointed out that only minor growth in rental revenues in years two, three, four and five could be counted upon, because large conventions are booked five years in advance at fixed or nearly fixed rental rates. The only growth in revenues that could be counted upon would be an approximate 8% per year growth in concession income and a slight growth in annual usage.

PROJECTED YBC OPERATING REVENUE

	Year 1	Year 2	Year 3	Year 4
Hall Rentals	$1,045,000	$1,128,600	$1,218,888	$1,316,399
Food & Beverages	250,000	270,000	291,600	314,918
TOTAL REVENUES	$1,295,000	$1,398,600	$1,510,488	$1,631,317

ESTIMATED YBC OPERATING EXPENSES

Event & Facility Consultants have projected first year operating expenses for YBC to be $1,900,000, broken down by line item as follows:

Payroll	(60%)	$1,140,000
Maintenance	(4%)	76,000
Materials & Supplies	(9%)	171,000
Utilities	(15%)	285,000
Contract Services	(5%)	95,000
Insurance	(3%)	57,000
Adm. Overhead/ Office Supplies	(2%)	38,000
Contingencies	(2%)	38,000
TOTAL OPERATING EXPENSES (Excluding Debt Service & Advertising)		$1,900,000

Operating expenses shown above do not include advertising and promotion which could amount to another $390,000 (Dallas) to $450,000 (Los Angeles). The Event & Facility Consultants did not include this as a YBC operating item because of the likelihood that it would be funded through the San Francisco Convention and Visitors Bureau. (In Atlanta, Los Angeles and Dallas, this item appears as a convention center operating expense line item and is matched against operating revenues to get operating income or loss for these centers).

Operating expenses shown above do not include start-up costs for the YBC center for such items as brochures, printed stationery, graphics, etc. This item could amount to an extra $100,000 to $300,000 in the first year of operation. If annualized over the first five years of YBC center operation, this could amount to $20,000 to $60,000 in additional operating expenses--per year.

The payroll item of $1,140,000 includes an estimated salary of $40,000 to $50,000 for the convention center(s) manager; when this is deducted from the total, and the $17,000 average wage and overtime payment to Brooks Hall / Civic Auditorium non-managerial employees is divided into the remainder, this would result in an equivalent of 65 full-time employees in the YBC center at a city pay scale similar to that of Brooks Hall / Civic Auditorium. Both the Los Angeles and new Georgia Convention Centers have less usable space (net leasable square feet) than the proposed YBC Facility and have staffing levels 30 to 50% higher than budgeted by Event & Facility Consultants (see Table 5).

Event & Facility Consultants have estimated that the $1,900,000 total operating budget for the first year of YBC use would increase 8% per year due to inflation and increased use of facilities.

TABLE 5

COMPARISON OF CONVENTION CENTER OPERATING BUDGETS JOBS AND COSTS 1976-1977

FACILITY	NET LEASABLE[1] (SF)	ANNUAL OPERATING REVENUES[2] (excluding Park.)	ANNUAL OPERATING EXPENSES[2] (excluding Park. & Promotion)	EST. PERMANENT JOBS	JOBS/ 1000 SF NLA	ANNUAL OPERATING LOSSES	ANNUAL LOSSES/SF[1]
Brooks Hall/ Civic Auditorium	172,800	$ 467,197	$ 832,500	26	.15	$ 365,303	$2.12/SF
Los Angeles	285,000	1,459,000	2,036,000	85	.30	577,000	2.02/SF
Dallas	472,450	1,294,000	2,100,000	150	.32	806,000	1.71/SF
Georgia	280,000	754,300	1,939,000[3]	95	.25	1,184,700	4.23/SF (partial yr)
YBC[4] (EST.)	325,000	1,295,000	1,900,000	65	.20	605,000	1.86/SF

Brooks Hall was built in 1958 at a cost of approximately $4 million, civic auditorium was constructed in 1914 and renovated in 1964. Cost data on the Los Angeles facility is not available. The Dallas facility was built in 1975 at a cost of approximately $40 million. The Georgia facility was built in 1976 at a cost estimated at $36 million.
The proposed YBC facility has an estimated construction cost of $81.3 Million. Design and administration costs of $12 Million and land costs of $6.7 million would result in a total estimated cost of $100 million, excluding financing costs.

1 Net leasable area includes arenas and theaters and meeting and conference rooms, but does not include garage space even when this can be used for exhibit space (Dallas).

2 Operating revenues do not include parking revenues; operating expenses do not include debt service.

3 Does not include extraordinary start-up cost of $495,732, based on a partial year of operation. (8mos.)

4 Event & Facility Consultants Report, dated Jan. 1, 1978 (Does not include an estimated $400,000/year for Adv. & Promotion)

SOURCE: CONVENTION CENTER ANNUAL REPORTS, Lord & Leblanc

YBC OPERATING PROFIT/LOSS

Based on projections done by Event & Facility Consultants, as discussed above, operating losses each year are projected as follows:/9/

PROJECTED YBC OPERATING LOSSES

	Year 1	Year 2	Year 3	Year 4	Year 5
Operating Revenues	$1,295,000	$1,398,600	$1,510,488	$1,631,317	$1,761,833
Operating Expenses	$1,900,000	$2,052,222	$2,216,400	$2,415,876	$2,609,146
Operating Profit(Loss)	(605,000)	$ (653,622)	$ (705,912)	$ (784,559)	$ (847,313)

SOURCE: Event & Facility Consultants, January 1978.

These projected losses are judged by Lord & LeBlanc to be "best case" projections for the following reasons which are explored in more detail elsewhere in this report:

1. Smaller conventions may want to use the new YBC facilities even though they could be accommodated in Brooks Hall; this might result in bottlenecks in YBC scheduling which would prevent optimum utilization by the larger conventions.

2. The large number of convention centers being planned throughout the country;

3. The lack of valid recent survey data on YBC usage;

4. The lack of YBC controlled parking facilities, which might reduce the number of large daily visitor shows, and cause a loss of rental revenues--and would also eliminate a major source of revenue to the center from the parking lot fees.

5. A potential loss of catering revenues to local hotels and restaurants;

6. Advertising and promotion costs which could range from $390,000 to $450,000 per year, but are not included in the operating expenses as the additional expense for YBC in relation to the current expenditure through the Convention and Visitors Bureau has not been determined;

7. Start up costs which have not been included, but could amount to $20,000 - $60,000 per year over the first five years; and

8. The possibility that Event & Facilities Consultants may have under-estimated total payroll costs when they used the figure of $1,140,000 as their total annual payroll estimate. Brooks Hall / Civic Auditorium, with an average annual wage of $17,000 for non-managerial staff personnel, provides the only guide for determining wages at the new facility, and Brooks Hall wages, divided into YBC payroll estimates, seem to result in fewer staff positions for YBC than currently being used in other similar convention centers throughout the county.

For the reasons discussed above, Lord & LeBlanc estimates that "worst case" operating losses could be 80% greater than those projected by Event & Facility Consultants.

On this basis, "worst case" YBC operating losses are estimated to be $1.09 million per year.

BROOKS HALL / CIVIC AUDITORIUM OPERATING PROFIT/LOSS

Brooks Hall / Civic Auditorium in 1976-77 had an operating staff of 26 persons (A convention manager [1]; an assistant manager [1]; secretary [1]; janitor supervisors [2]; janitors [10]; building superintendent [1]; sanitary engineers [5]; patrol persons [3]; carpenter [1]; and electrician [1].) Total wages and salaries including overtime were approximately $472,000, or an average annual wage of $18,154 per employee, including managerial employees. Excluding managerial employees, average compensation in 1976-77 was $17,000, including overtime pay per employee. Eleven of the 26 employees of Brooks Hall / Civic Auditorium are Department of Public Works employees working full time at Brooks Hall / Civic Auditorium. Studies done of Brooks Hall / Civic Auditorium operating income in previous EIR's tended to lack reliability because operating budgets for the facilities did not include budgeted costs for Department of Public Works employees.

Brooks Hall Rental Rates:

	Net Leasable	Rent To Sit Down Groups (Net Sq. Ft.)	Rent To Exhibitors (Net Sq. Ft.) Show Day	Set Up Day
Civic Auditorium	32,550 sq. ft.	$.02-$.07	$.03	$.01
Brooks Hall	110,000 sq. ft.	$.01	$.01	$.005
			$.025*	$.013*

*net net

In fiscal year 1976-77, Brooks Hall / Civic Auditorium had total revenues of $467,197, and total operating expenses estimated by Lord & LeBlanc of approximately $832,500 for a net operating loss of $365,303.

It is estimated by Lord & LeBlanc that the opening of YBC would result in a 25% to 40% reduction in Brooks Hall / Civic Auditorium revenues in the first full year of operation of the new YBC facility. Because nearly all permanent employees at the Brooks Hall / Civic Auditorium facility are managerial, maintenance or security personnel, and because most maintenance and security work must be done even if the facility is not used at full or nearly full capacity, no reduction of operating costs is anticipated once YBC comes on stream. With no reduction in Brooks Hall / Civic Auditorium expenses, and a 25% to 40% decrease in operating revenues, losses for the older facility could be expected to increase to $460,000 to $511,000 per year from a 1976-77 loss of $365,303 (all losses expressed in 1977 dollars). Until an actual survey is conducted which asks current Brooks Hall / Civic Auditorium users if they will switch to the new YBC facilities, estimates of this kind cannot be validated.

Experience with a similar facility displacement problem occurred in Oakland, when the old Municipal Auditorium Complex in downtown Oakland near Lake Merritt, with exhibit space of 24,000 net square feet (140 booths), theater seating for 2,002, and arena seating capacity of 6,300, was faced with competition from the newly constructed Oakland/Alameda County Coliseum Complex. The manager of the older facility reported, in 1971, that there was a definite slowdown in his facility's usage initially, but "the gap was soon filled with other smaller groups, and although the older facility lost the larger events, many groups that had tried the Coliseum, had returned to the smaller building because of the difference in costs."

If the new YBC facility can successfully recruit the larger associations or exhibitors (100,000 net square feet and above), and if the smaller exhibitors return to Brooks Hall because of lower rents, the net effect on municipal revenues would be positive (a reduction of total YBC / Brooks Hall losses). If this market segmentation is not possible, increased patronage at the Brooks Hall facility in later years will be offset by decreased patronage at YBC.

REGIONAL COMPARISON OF CONVENTION CENTER BUDGETS

Table 5 compares the operating budgets for Brooks Hall and three newer convention centers comparable to the proposed YBC Center. The Georgia World Congress Center in Atlanta (280,000 net square feet of exhibit and arena space), the Los Angeles Convention and Exhibit Center (285,000 net square feet of exhibit space), the Dallas Memorial Auditorium and Convention Center (472,500 net square feet of exhibit, arena, theater and ballroom space) and the proposed YBC facility with approximately 325,000 net square feet of exhibit space including meeting rooms.

In order to make comparisons meaningful, parking revenues were deleted from those centers having parking facilities, and parking and advertising costs were deleted from the expenditures side of center budgets to make comparisons with the proposed YBC facility meaningful.

In Table 5, it can be seen that losses for the four facilities surveyed ranged from a low of $1.71 per net square feet of leasable area for the Dallas facility, to a high of $4.23 per net square foot at the Georgia facility. Extreme losses at the Georgia facility were due in part to a contractual dispute with the principal concessionnaire, which resulted in no concession income for the first seven months of operation. Total annual operating losses shown in Table 5 range from a low of $365,303 for Brooks Hall / Civic Auditorium, to a high of $1,184,700 for the Georgia Center. The loss at the Georgia World Congress Center required an appropriation from the State of Georgia, which is responsible for the operation of the Center, of more than a million dollars in 1977 in order to balance the Center's budget.

The Georgia Center reported 18 major conventions and trade shows hosted during the 1976-1977 fiscal year (November 76-June 77). Sixteen (16) recommitted for future dates in the Center. Ten (10) of the 16 committed to return on a regular rotation basis. /10/

The Los Angeles Center reported that 27% of rental revenues were from consumer shows, 40% from trade shows and only 32% were from convention and meeting room rentals. /11/

PERMANENT CONVENTION CENTER JOBS

YBC STAFF JOBS

Table 5, column 5, shows estimated permanent convention center jobs for the Los Angeles, Dallas, Georgia and San Francisco centers. Permanent convention center jobs ranged from a low of 26 at Brooks Hall / Civic Auditorium, to a high of 150 permanent jobs at the Dallas facility. The proposed YBC Center, with approximately 65 jobs budgeted by the Event & Facility Consultants, would have a job efficiency ratio of .20 (.20 jobs per 1,000 square feet of net leasable area), exceeded in efficiency only by Brooks Hall with a job efficiency ratio of .15 jobs per 1,000 square feet of net rentable floor area.

PRIVATE CONCESSION JOBS

Concession service workers are not included in staff job estimates, because all of the centers shown in Table 5 have food and beverage concessions operating under private contract. With a rate of return of 15% of sales, $2.2 million in concession sales per year by the YBC facility would generate a net profit to the concession management of $330,000 per year. Three-fourths of this estimated net profit per year would be required to be given under the licensing contract to the YBC management

to achieve concession income projected by the convention consultants. Concession sales of $2.2 million could be expected to generate a demand for 50 to 80 full time concession jobs, based on a factor of one direct job for every $30,000 of direct tourism expenditure. Not all concession jobs would be located within the YBC center itself.

PERMANENT CRAFTS JOBS FOR SET UP AND TAKE DOWN OF EQUIPMENT

Previous YBC studies have shown that approximately 23,000 person-hours of direct labor are involved in setting up facilities, providing services during show days, and taking down booths and equipment involved in a 25,000 delegate AMA (American Medical Association) convention having five show days and 12 set up and take down days. The 23,000 person-hours is the equivalent of about 12 person years of direct crafts labor per 25,000 delegates./12/

The AMA model is considered not to be typical of conventions averaging 10,000 to 14,000 delegates, because set up and take down days generally run no more than 1.5 times actual show days. A lower ratio of 7 to 8 person years of direct crafts labor per 25,000 delegates will be used.

Twelve to 18 major San Francisco conventions per year, having an average delegate count of 12,000 per convention, might require from 40 to 70 person years of direct crafts labor on a continuing annual basis.

Local unions involved in providing jobs of this type would be Local 6--Electricians Union; Local 510--Display and Signs Union; Local 85--Teamsters Union; Local 39--Stationary Engineers Union; plus other unions involving security guards, photographers, carpenters, etc.

Perhaps 25% to 40% of YBC Convention Center concession and crafts jobs would be held at the expense of similar jobs in hotels or private facilities or Brooks Hall / Civic Auditorium--at least for the first few years of YBC operations until the other facilities are able to capture delegates from other convention markets.

TEMPORARY CONSTRUCTION LABOR

The projected construction cost of the YBC center is $81,300,000, excluding design and administrative costs. Precise estimates of total person-years of construction employment can be made only by the general contractor; however, general estimates can be made based upon the following formula:

TOTAL CONSTRUCTION COSTS	$81,300,000
less Contractor's Profit (10%)	(8,130,000)
less Materials (40%)	(32,520,000)
less Overhead & Subcontractor's Profit (7%)	(5,691,000)
less Contingency (2%)	(1,626,000)
TOTAL LABOR COSTS	$33,333,000
Days of labor @ $98 average wage/day	340,133
Person-years at 185 work days/year, allowing for weather factors	1,839 person-years of direct "on site" labor OR 919 jobs lasting 2 years OR 613 jobs lasting 3 years.

Additional temporary jobs involving off-site prefabrication of materials, and indirect spending-induced jobs, could be anticipated.

NEW DELEGATE EFFECTS ON OFF-SITE TOURISM INDUSTRIES

The Convention and Visitors Bureau currently lists 53 associations that have recently indicated that they will meet in San Francisco, during the next five years, only if the Convention Center is constructed. Table 6 shows anticipated attendance by association.

The total delegate count over the five-year period is 736,000, or an average of 147,000 delegates per year. Average conventions per year would be 10, and the average size of each delegation would be 14,000 members.

Surveys such as this are not entirely reliable indications of net sustainable annual demand for facilities because unlike the McCue survey, they do not show whether any of the associations would hold more than one convention within the five-year period--nor do they show which groups would return only infrequently after the initial meeting.

The American Newspaper Publishers Association, which appears on Table 6, holds its west coast convention once every eight years. The Radiology Society of North America, also listed in Table 6, holds its western convention once every eight years. The National Association of Music Merchants, on the other hand, meets yearly on the west coast.

Until a considerable amount of precise new survey work is done, and surveys such as the one shown in Table 6 are scientifically analyzed and results are compiled on an annualized basis, "net" impact studies, even when done on a "worst case"/"best case" format, are little more than educated estimates.

TABLE 6

NEW CONVENTIONS TO SAN FRANCISCO

ATTENDANCE	ASSOCIATION
10,000	Menswear Retailers of America
6,000	Golf Course Superintendents of America
24,000	American Federation of Information Processing Socie
5,000	American Society for Microbiology
4,000	National Solid Wastes Management Association
6,000	Society of Nuclear Medicine
5,000	National Association of Plumbing, Heating & Cooling Contractors
20,000	American Hospital Association
25,000	American Dental Association
12,000	Dairy & Food Industry Supply Association
4,500	National Recreation & Park Association
6,000	National Sporting Goods Association
12,000	National Printing Equipment Show
6,000	National Audio Visual Association
11,000	National Association of Secondary School Principals
8,000	Association of Operating Room Nurses
11,000	American Association of School Administrators
12,000	National Catholic Education Association
10,000	National Microfilm Association
6,000	American Public Works Association
4,500	National Office Machine Dealers Association

(continued)

TABLE 6

NEW CONVENTIONS TO SAN FRANCISCO (Continued)

ATTENDANCE	ASSOCIATION
6,000	American Veterinary Medical Association
7,000	National Association of Printers & Lithographers
7,000	American Heart Association
7,500	American Vocational Association
15,000	Federation of American Societies for Experimental Biology
10,000	Automotive Parts & Accessories Association
6,000	American Mining Congress
20,000	Electronic Industries Association
13,000	Automotive Service Industry Association
17,000	Plant Engineering & Maintenance Show
19,000	Baking Industry Exposition
12,000	American Booksellers Association
8,000	American Apparel Manufacturers Association
13,000	Instrument Society of America
13,000	American Rental Association
14,000	American Institute of Chemical Engineers
6,000	American Fishing Tackle Manufacturers Association
200,000	AFL-CIO -- Union Industries Show
8,000	American Newspaper Publishers Association
12,000	National Association of Music Merchants
3,500	Radiological Society of North America
26,000	Society of Manufacturing Engineers
10,000	American Foundrymen's Society
8,000	National Soft Drink Association
13,000	National Association of Broadcasters
20,000	American Federation of Mineralogical Societies
2,000	National Hardware Builders Association
6,000	American Institute of Aeronautics and Astronautics
8,000	Association for Educational Communications & Technology
5,000	Institute of Food Technology
8,000	American Society of Biological Chemists
5,000	Construction Specifications Institute
736,000	Total 5-Year Attendance

Average Annual Delegate Total	147,200	Average Conventions Per Year	10
Average Size of Delegation	14,000	Average Size of Delegation (Excluding AFL-CIO Union)	10,509

SOURCE: SF Convention & Visitors Bureau
Lord & LeBlanc

Lord & LeBlanc has assumed that the Convention and Visitors Bureau survey averages, shown in Table 6, represent a "best case" scenario. A "worst case" scenario, which has 30% fewer new conventions visiting San Francisco each year, has been developed. "Worst case" scenario conventions are projected to be smaller in size, with an average delegate count of 11,000 vs. 14,000 under the "best case" scenario.

New delegate expenditures in the San Francisco tourism industry can be estimated only on the basis of studies done by the San Francisco Convention and Visitors bureau, which indicate that the average "out-of-town" convention delegate remains in San Francisco for 4.5 days and spends an average of $75 per day in the local economy. These studies, based on 1976-77 dollars, show that the average convention delegate spends approximately $340 in the local economy during a stay in San Francisco.

From Table 7 it can be seen that seven to ten new conventions having an average of 11,000-14,000 out-of-town delegates per convention are projected to meet in San Francisco annually if YBC is built, but would not meet in San Francisco if the new exhibit facility is not built. As a direct result of these seven to ten new or "net" conventions which are projected to be held every year, 77,000 to 140,000 new out-of-town delegates are projected to visit San Francisco each year. Seventy to 80% of these new delegates (54,000 to 112,000 delegates) might stay overnight in San Francisco and could spend from $26.2 million to $50.4 million in the local economy. Between $9.2 million and $17.7 million could be spent in San Francisco hotels or motels.

If, under the provisions of Proposition S, the hotel room tax is raised to 8%, with 4% used to finance the YBC exhibition center, then more money might be removed from the disposable income each year of some three million citywide hotel/motel patrons by the YBC portion of the room tax ($278 million, 1977 estimated hotel/motel sales x 4% = $11.1 million), than will be spent by new YBC out-of-town conventon delegates on hotel/motel rooms only, under the "worst case", most pessimistic spending assumptions shown on Table 7.

If it can be hypothesized that overnight visitors to San Francisco of all types--both convention, business and tourist--establish some form of budgeting limit on their spending in the city (e.g., $50 to $100 per person per day), then a case can be made for the assumption that $11.1 million in disposable tourist income which is removed each year by a 4% hotel tax on some three million citywide overnight visitors, might not be spent in retail stores, restaurants or sightseeing establishments throughout the city by these overnight visitors. If this is the case, three new conventions having at least 33,000 new convention delegates (break-even level), must use YBC annually and spend an estimated $11.1 million in the local economy, in order to offset the $11.1 million in disposable income which is projected to be removed each year from overnight visitors' travel budgets by the 4% portion of the hotel room tax which will finance the convention center.

TABLE 7

ANNUAL NET EFFECT OF
YBC CONVENTION FACILITIES

(In 1977 Dollars)

		ROOM TAX BREAKEVEN LEVEL	WORST CASE	BEST CASE
New or "net" conventions/year		3	7	10
Average delegate count/convention		11,000	11,000	14,000
Total new or "net" out of town delegates[1]		33,000	77,000	140,000
New or "net" show days/year		15	35	50
New or "net" set-up & take-down days/year		19	45	70
New or "net" total facility use days/year		34	80	120
Net delegate spending in San Francisco (Net out of town delegates x $340-360 per delegate)[2]		$ 11.4 million	$26.2 million	$50.4 million
Net delegate spending in San Francisco				
SPENDING	ALLOCATION[2]			
Hotel/Motel Rooms	(35.1%)	$ 3.91	$9.20	$17.69
Restaurants	(27.5%)	3.06	7.21	13.86
Retail Stores	(13.6%)	1.52	3.56	6.85
Local Transportation	(3.8%)	0.42	1.00	1.92
Sightseeing	(2.3%)	0.26	0.60	1.16
Entertainment	(8.1%)	0.90	2.12	4.08
Auto-Related	(3.1%)	0.35	0.81	1.56
Other	(6.5%)	0.72	1.70	3.28
TOTAL	100.0%	$11.14 million	$26.2 million	$50.4 million

1 Delegates who would not use the YBC Convention Center at the expense of other San Francisco Exhibit Facilities, such as Brooks Hall or hotel facilities.

2 Total spending per out of town convention delegate, and percentage allocations of delegate spending, are based upon studies conducted by the San Francisco Convention and Visitors Bureau.

SOURCE: Lord & LeBlanc; San Francisco Convention and Visitors Bureau

A new convention center financed by 4% hotel/motel room tax is not the only method which could be employed for stimulating the San Francisco tourism industry. Hotel tax revenues could be used to purchase discount coupons from hotels, restaurants, retail stores, and sightseeing and airline proprietors, and these coupons could be given to tourists visiting the city./13/ Hotel tax revenues could be used to provide direct subsidies to private developers of tourist oriented facilities. If a convention center is built, it might be expected, however, to generate more new tourism spending in San Francisco by new out-of-town delegates each year, than is removed each year by a 4% tax on hotel/motel room sales to some three million overnight tourists who visit the city every year. Three new large conventions per year might be expected to generate this 'break-even" level of new expenditure, which would offset some $11.1 million in hotel tax collections used to finance the YBC exhibition facility. Table 7 displays this "break-even" relationship.

DELEGATE SPENDING INDUCED JOBS

Table 8 projects net delegate spending on a worst and best case scenario, then allocates jobs on the basis of new delegate spending.

For the "worst case" set of assumptions, net spending in the tourist and retail sectors of the San Francisco economy has been projected at $26.2 million annually. For rough estimation purposes, $30,000 in annual sustainable tourist-related spending will generate one direct permanent job in the tourist industry. Using this rule of thumb, $26.2 million in net delegate spending per year could be counted upon to generate approximately 873 direct permanent jobs in trouist-related industries. Table 8 allocates these jobs between Hotel/Motel (307); Restaurants (240); Retail (119) Local Transportation (33); Sightseeing (20); Entertainment (72); Auto-Related (27); and Other (56) for "worst case" assumptions.

Most of the 873 direct permanent jobs in tourism-related fields would be relatively low-paying white collar service or clerical positions with a salary range of $9,000 to $12,000 per year or an average of $10,500 per year. Thus, 873 estimated permanent direct YBC jobs would be expected to generate a payroll of approximately $9 million per year. Sixty percent of this payroll would be spent in San Francisco, 40% would be spent in other Bay area locations by employees living outside San Francisco. /14/

Reference can be made to Table 8 for job allocations for the "best case" scenario.

The entire earning and spending chain or cycle, as it ripples through the local economy, could generate another 873 indirect jobs. (Employment multiplier of 2, i.e., one indirect job for each permanent direct job caused by tourism-related spending by new convention delegates)./15/ These 873 indirect jobs would not necessarily be in the tourism sector, nor would they all be in the San Francisco economy. Many low-paid tourism-related employees could be expected to live and spend a large portion of their income in northern San Mateo County or Alameda or Contra Costa County.

For estimation purposes, perhaps 60% of both direct and indirect jobs could be expected to be held by San Francisco residents, and 40% of direct and indirect jobs would be held by non-San Francisco residents./14/

TABLE 8

INDUCED EMPLOYMENT FROM YBC--NEW DELEGATE EXPENDITURES - 1977 DOLLARS

	"WORST" CASE	"BEST" CASE
Net delegate spending in San Francisco annually[1]	$26.2 million	$50.4 million
Direct net new employment (One job per $30,000 in tourist-related spending)[2]	873 direct jobs	1,680 direct jobs

	NET DELEGATE SPENDING	NET DIRECT JOBS	NET DELEGATE SPENDING	NET DIRECT JOBS
Hotel/Motel Rooms	$ 9.20 million	307 jobs	$17.69 million	590 jobs
Restaurants	7.21	240	13.86	462
Retail Stores	3.56	119	6.85	228
Local Transportation	1.00	33	1.92	64
Sightseeing	0.60	20	1.16	39
Entertainment	2.12	71	4.08	136
Auto-Related	0.81	27	1.56	52
Other	1.70	56	3.28	109
TOTAL	$26.2	873	$50.4	1,680

[1]Spending estimates are based on San Francisco Convention and Visitors Bureau estimates displayed in Table 7.

[2]One direct job per $30,000 in tourist-related spending is based on previous studies done for the 1973 EIR, and on U.S. Department of Commerce estimates of one (Direct & Indirect) job per $15,000 in tourist spending.

See: Yerba Buena Center Public Facilities and Private Development EIR Draft, May '73, Arthur D. Little, Inc., URS Research Co., pg. V-A-102 and V-A-103.

Table 9 shows a breakdown of Bay area and San Francisco YBC delegate induced jobs--both direct and indirect, for the entire Bay area and for San Francisco.

TABLE 9: YBC DELEGATE INDUCED JOBS HELD BY SAN FRANCISCO RESIDENTS AND TOTAL BAY AREA RESIDENTS

	Worst Case	Best Case
To Bay Area Residents:		
Direct Jobs	873	1,680
Indirect Jobs	873	1,680
TOTAL YBC JOBS	1,746	3,360
To San Francisco Residents:		
Direct Jobs (60%)	524	1,008
Indirect Jobs (60%)	524	1,008
TOTAL	1,048	2,016

SOURCE: Lord & LeBlanc

Tables 10 and 11 display all YBC exhibition center related jobs--both direct and indirect, "off-site" and "on-site". Also shown are projections of San Francisco payroll income subject to any present or future payroll tax, and estimated payroll income of employees who will live within San Francisco city/county limits.

Under the "worst case" assumptions, a total of 2,056 direct and indirect new jobs, with an annual taxable San Francisco payroll of approximately $18 million might be anticipated. Of these 2,056 total jobs, 1,234 or 60% would be held by San Francisco residents who would, in the aggregate, earn approximately $14 million each year from convention center related employment.

Under the "best case" assumptions, a total of 3,746 direct and indirect new jobs, with an annual taxable city payroll of approximately $32.5 million might be anticipated. Of these 3,746 total jobs, 2,248 or 60% would be held by San Francisco residents who would collectively earn approximately $25.7 million annually from YBC exhibit hall related jobs.

At an estimated construction cost of $100 million including land, the YBC facility would require $97,280 in capital investment per direct job under "worst case" assumptions, and $53,390 in capital investment per direct job under "best case" assumptions. Private industry averages are approximately $37,000 per direct job (national average) but individual capital intensive private manufacturing industries have averages twenty times this amount./16/

Temporary on-site construction employment has been estimated to total 1,839 person years of direct construction trades labor. If construction of the exhibition facility requires two years, then an equivalent of 919 building trades jobs lasting for two years would be generated by the project. If construction of the facility requires three years, an equivalent of 613 building trades jobs lasting for three years would be generated by the convention center project.

TABLE 10

YBC CONVENTION CENTER-RELATED EMPLOYMENT

"WORST CASE"

	DIRECT JOBS	INDIRECT JOBS	TOTAL JOBS	ESTIMATED ANNUAL SALARY	S. F. ANNUAL TAXABLE PAYROLL[1]	SF RESIDENT JOBS (60%)	ESTIMATED TOTAL ANNUAL SF RESIDENT PAYROLL INCOME
Delegate-induced jobs	873		1746	$10,500	$ 9,166,500	524	$5,502,000
		873		12,000	6,285,600	524	6,285,000
YBC staff jobs	65		130	17,000	none	39	663,000
		65		12,000	468,000	39	468,000
YBC concession jobs	50		100	9,000	450,000	30	270,000
		50		12,000	360,000	30	360,000
YBC crafts jobs	40		80	18,000	720,000	24	432,000
		40		12,000	288,000	24	288,000
TOTAL PERMANENT JOBS	1028	1028	2056	$10,500-$17,000	$17,738,100	1234	$14,268,000/YBC
Construction jobs (Annual/2-year duration)	919		1839	$18,000	$16,542,000	551	9,918,000
		919		12,000	6,616,000	551	6,616,000
TOTAL TEMPORARY JOBS (2-year duration)	919	919	1839	$12,000-$18,000	$23,158,000	1102	$16,534,000/YBC

[1] Assumes 100% of all direct jobs and 60% of all indirect jobs will be subject to any present or future San Francisco payroll tax.
[2] Assumes 60% of all jobs are held by San Francisco residents.

SOURCE: Lord & LeBlanc

YBC CONVENTION CENTER-RELATED EMPLOYMENT

"BEST CASE"

	DIRECT JOBS	INDIRECT JOBS	TOTAL JOBS	ESTIMATED ANNUAL SALARY	S. F. ANNUAL TAXABLE PAYROLL[1]	SF RESIDENT JOBS (60%)	ESTIMATED TOTAL ANNUAL SF RESIDENT PAYROLL INCOME
Delegate-induced jobs	1680		3360	$10,500	$17,640,000	1008	$10,584,000
		1680		12,000	12,096,000	1008	12,096,000
YBC staff jobs	81		162	17,000	none	49	833,000
		81		12,000	583,200	49	583,200
YBC concession jobs	62		124	9,000	558,000	37	333,000
		62		12,000	446,000	37	446,000
YBC crafts jobs	50		100	18,000	900,000	30	540,000
		50		12,000	360,000	30	360,000
TOTAL PERMANENT JOBS	1873	1873	3746	$ 9,000-18,000	$32,583,200	2248	$25,775,200
Construction jobs (Annual/2-year duration)	919		1838	$18,000	$16,542,000	551	$ 9,918,000
		919		12,000	6,616,000	551	6,616,000
TOTAL TEMPORARY JOBS (2-year duration)	919	919	1838	$12,000-$18,000	$23,158,000	1102	$16,534,000

[1] Assumes 100% of all direct jobs and 60% of all indirect jobs will be subject to any present or future San Francisco payroll tax.
[2] Assumes 60% of all jobs are held by San Francisco residents.

SOURCE: Lord & LeBlanc

Indirect jobs would be created when construction laborers spend their incomes; these indirect jobs could be estimated on the basis of a one to one ratio, or one indirect job for every direct construction job.

Direct construction payroll would amount to approximately $16.5 million per year for two years or $11.1 million each year for three years. Indirect construction related jobs would be temporary in nature.

SUMMARY IMPACTS
YBC CONVENTION CENTER
(1977 DOLLARS)

ANNUAL TOTAL IMPACT:	"WORST CASE"	"BEST CASE"
Conventions	12	18
Out-of-Town Delegates	120,000	235,000
Local Visitors (non-overnight)	300,000	540,000
Total Use Days	132	216
Annual YBC Operating Losses	$1,089,000	$ 605,000
Annual Brooks Hall Operating Losses	511,000	460,000
Annual Combined Operating Losses	$1,600,000	$1,065,000
Annual Operating Losses Over Life of Bond Issue (30 years)	$48 million	$32 million

NET IMPACT-ANNUAL SUSTAINABLE LEVELS

Conventions (new)	7	10
Out-of-Town Delegates (new)	77,000	140,000
New Delegate Spending	$26.2 million	$50.4 million
Permanent new Jobs (direct)[1]	873	1,680
Permanent new Jobs (indirect)[1]	873	1,680
Total New Permanent Jobs	1,746	3,360
(San Francisco Residents)	(1,048) (60%)	(2,016) (60%
Annual Taxable Payroll	$15.5 million	$29.7 million
(San Francisco resident payroll)	($11.8 million)	($22.7 million)

ON-SITE CONSTRUCTION IMPACT

Total On-Site Construction Labor	1,839 person years	1,839 person year
Annualized On-Site Jobs (two years)	919	919
Total On-Site Building Trades Payroll	$33.3 million	$33.3 million
Annualized On-Site Payroll (For two-year buildout)	$16.6 million	$16.6 million
Wholesale Value of Building Materials	$32.5 million	$32.5 million

1/ Does not include 65 to 85 city staff employees working in the YBC Complex and 90 to 112 private concession jobs within the YBC Complex.

SOURCE: Lord & LeBlanc Estimates

POTENTIAL NEW SAN FRANCISCO FISCAL BENEFITS
YBC EXHIBITION CENTER
(Annual 1977 Dollars)

NEW TOURIST RELATED MUNICIPAL REVENUES	WORST CASE	BEST CASE
HOTEL TAX, On New Delegate Spending for Hotel/Motel Rooms (8%) (see Table 8)*	$ 736,000	$1,415,000
SALES TAXES on New Delegate Spending in San Francisco. (1% of 80% of new Delegate Spending) (see Table 8)	$ 209,500	$ 403,000
SALES TAXES on Retail Spending by Those Persons with New Jobs. (Assume 60% of new jobs will be held by S.F. residents who will spend 40% of their new income on taxable retail items.) (see Tables 10 and 11)	$ 47,000	$ 91,000
CITY PAYROLL TAX on the Annual Payroll of the Employers of the New Jobholders. (Assume 40% of these employers fall within exemption.) (See Tables 10 and 11)	$ 102,000	$ 196,000
PROPERTY TAX on a 200 to 400 Room Hotel which would be the very minimum requirement for providing accommodations to new delegates. (Assume 15 to 30 million dollars worth of new hotel construction.)	$ 450,000	$ 900,000
PROPERTY TAX on 45,000 to 85,000 square feet of additional retail space which would be the minimum required to handle new delegate spending.	$ 67,500	$ 127,500
ANNUAL CITY REVENUES WHICH CAN BE CALCULATED OR ESTIMATED	$1,612,000	$3,132,500

*Much of this revenue source may be committed to amortizing convention center construction bonds, and providing low-rent housing subsidies within the YBC area, and therefore might not be relied upon for offsetting convention center operating losses.

SOURCE: Lord & LeBlanc Estimates

ANNUAL CITY REVENUES WHICH CANNOT BE CALCULATED

1. Payroll taxes and retail sales taxes on income and spending of building trades workers during the 2+ years of YBC construction.
2. Sales tax and inventory taxes on YBC building materials used and stored in the county during construction of the Center.
3. Cigarette, alcoholic beverage taxes and licensing fees.
4. Taxicab and other transportation licensing fees.
5. Property taxes (inventory taxes) on producers and distributors of tourist related retail items, food, beverages, etc.

POTENTIAL ANNUAL SAN FRANCISCO

INDIRECT FISCAL BENEFITS -- YBC EXHIBITION HALL

(1977 Dollars)

	WORST CASE	BEST CASE
PROPERTY TAXES on 2,300 to 3,100 new hotel rooms which are projected to be built as a result of growth expectations within the hotel industry. (7 year typical growth cycle, and hotel rooms having a value of approximately $75,000 per room)[1]	$5.2 million	$7.0 million
NET ANNUAL CITY REVENUES AT FULL HOTEL DEVELOPMENT (Approximately 1987)[2]	$5.2 million	$7.0 million

1/ Both the San Francisco Convention and Visitors Bureau (Mr. Robert Sullivan) and the hotel industry consulting firm of Laventhol and Horwath (Edwin R. Mihm), have used the range of 2,500 to 3,500 new hotel rooms which would be built if the YBC exhibit hall is constructed. Deducting the 200 to 400 rooms required for direct housing of new delegates leaves the 2,300 to 3,100 figure used.

2/ It is not possible to say that these new hotel rooms are a "direct result" of construction of the YBC facility. The projected 77,000 to 140,000 new convention delegates annually, would require 200 to 400 new hotel rooms. Hotel consultant studies have shown, however, that large convention center development can result in new demand for 2,500 to 3,500 new hotel rooms in a city such as San Francisco having 70 to 80% occupancy levels. How much of this new hotel development would take place if YBC is not built cannot be determined at this point.

SOURCE: Lord & LeBlanc; San Francisco Convention & Visitors Bureau.

FOOTNOTES - APPENDIX D.4

/1/ San Francisco Convention and Visitors Bureau, Memo dated February 21, 1978, showing the breakdown of 1977 conventions in San Francisco by number of delegates: Meetings with fewer than 1,000 registered delegates, 751 (82.9%); Meetings with between 1,000 and 3,000 delegates, 93 (10.28%); Meetings with more than 3,000 registered delegates, 61 (6.74%); Total 1977 conventions: 905.

/2/ Based upon recent discussions by Lord & LeBlanc staff, with Mr. Edwin R. Mihm of LAVENTHOL & HORWATH, a national CPA and hotel industry consulting firm.

/3/ The San Francisco Convention and Visitors Bureau, in a recent survey dated February 22, 1978, lists organizations that are expected to use the new YBC facilities. The large American Medical Assocation is not on this list, but the smaller American Academy of Family Physicians, American Academy of Pediatrics, American Academy of Orthopaedic Surgeons, American Academy of Dermatology, American Psychiatric Association, American College of Cardiology, and American Academy of Ophthalmology and Otolaryngology, are included.

/4/ West coast convention centers currently being planned or studied, or built, include, but are not limited to the following: Vancouver, B.C.; Portland, Oregon; Santa Rosa, California; San Jose, California; Burlingame, California; San Diego, California.

/5/ William A. Cunningham, Survey of Practices & Policies: Arenas over 5,000 Seats (A survey of members of the International Association of Auditorium Managers) July 1970, pages are not numbered.

/6/ Ibid.

/7/ Telephone communication with Mr. Dana Lewis of the Cow Palace management staff, November 18, 1977 and January 27, 1978.

/8/ Event & Facility Consultants, Portland, Oregon, Operational Expense/Revenue Estimates, YBC, January 13, 1978, pp. 1 and 2.

/9/ Ibid. pp. 3 and 4.

/10/ Annual Report, Georgia World Congress Center, August 15, 1977, last page.

/11/ Annual Report, Los Angeles Municipal Auditorium Department, August 10, 1977. (Xerox copy, page numbers did not copy).

/12/ Stuart Sauter & Company, and URS Research Company. (see page V-A-74 of 1973 YBC Environmental Impact Report.

/13/ Although specific studies to support this point of view cannot be cited, there is considerable support based on logic alone for the view that the type of tourist that would be lured to San Francisco by a citywide

subsidy on such items as airline tickets, restaurants, etc., would not be the type of tourist that could be expected to spend large sums of money in the local tourism economy. Out-of-town convention delegates, of the type that would be attracted to very large national conventions that would be held in the proposed YBC exhibit hall, are generally able to write a large portion of travel and hotel and dining expenses off their income taxes as business or professional expenses. Out-of-town delegates of this type, according to Convention and Visitor Bureau statistics, spend considerably more money in the local economy than private tourists, or non delegate routine buiness visitors. Ordinary tourists who would not come to San Francisco unless lured by subsidized discounts, might be expected to fall at the lowest scale on any spending index.

/14/ For a detailed analysis of survey data on residential location and income of San Francisco employees, see Environmental Impact Report, Bank of America Data Center, Gruen, Gruen + Associates; San Francisco Department of City Planning, August 28, 1975, pp 91-96 Volume I. Recent traffic studies also tend to support a 60%/40% resident commuter ratio. [see page 84, Appendix F, Table F-14 of this (YBC) EIR].

/15/ The "Multiplier Effect", a term coined by John Maynard Keynes, relates to this direct job/indirect job relationship. The 1973 EIR estimated that a "multiplier" of 2.4 would be a reasonable indicator of secondary employment impacts. This means that for every "net" YBC related direct job, 1.4 new or net indirect jobs would be created throughout the Bay area economy, when direct YBC jobholders spend their "newly created" salary in communities where they live and work, and create new "indirect" job opportunities for merchants and service workers who receive this "newly created" money in the form of wages, interest, rent, or profits, save a portion, and spend the rest continuing the cycle. There are few valid studies of the magnitude of the multiplier effect on a regional basis. For the Tourism Industry, a multiplier of 2 will be used; this denotes one indirect job for every direct job. Indirect jobs for the purposes of this study will be assumed to occur in the community where the direct jobholder lives. More precise allocations are impossible at this point.

/16/ Telephone conversations, January 25, 1978, and March 6, 1978, C.F. Hoffman, financial writer for several Bay area newspapers, and financial analyst and investment officer, L.F. Rothschild & Company, San Francisco. The DOW petrochemical complex which was scheduled for construction in the Bay area, but was moved out of state one year ago, was projected by DOW to cost $500 million and result in 1,000 permanent on-site jobs, (direct jobs). The cost per direct job in terms of private capital investment was projected to be $500,000. However, it was estimated that this facility would have created at least five off-site jobs among its downstream customers for every job it created directly. For a more detailed discussion of this facility, refer to minutes of the address by Paul F. Oreffice, President, Dow Chemical USA to the Commonwealth Club on January 20, 1978.

APPENDIX E: COMMUNITY SERVICES DETAILS

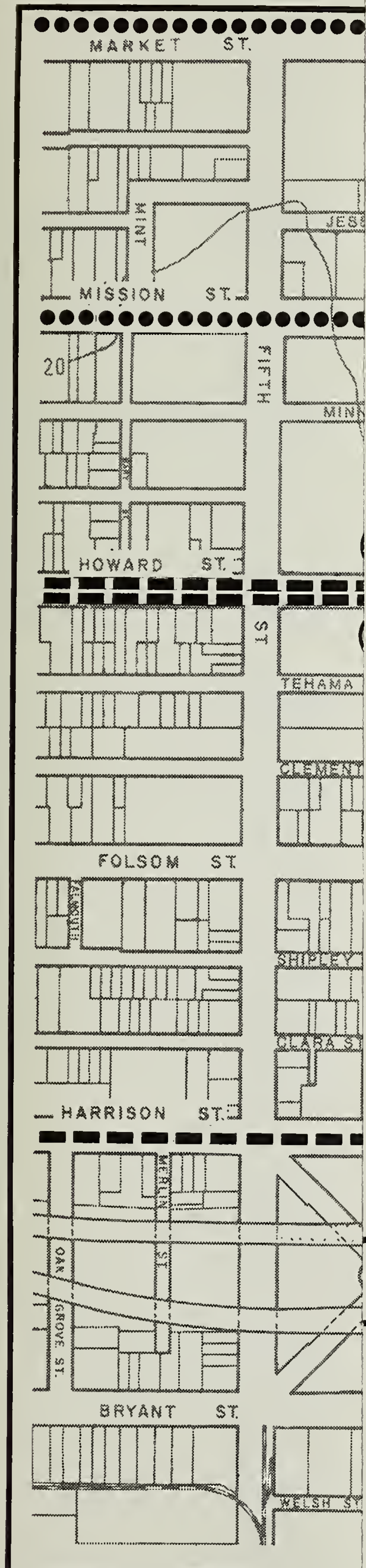
CONTENTS

1. WATER

a. Water Supply System

Water for San Francisco is moved from Crystal Springs and San Andreas Reservoirs to receiving in-City reservoirs. University Mound Reservoir, which serves YBC, is so situated that water can flow to it by gravity from Crystal Springs Reservoir, and from it by gravity throughout its entire service area along the lower elevations of the Financial District and the bayfront as far as the Marina.

The Redevelopment Area receives water via a group of four feeder mains located beneath the streets, shown in Figure E-1. Due to the "loop" system of interlocking mains, water to meet the urban needs in normal years is available on any street.



Feeder Water Mains (<20")*

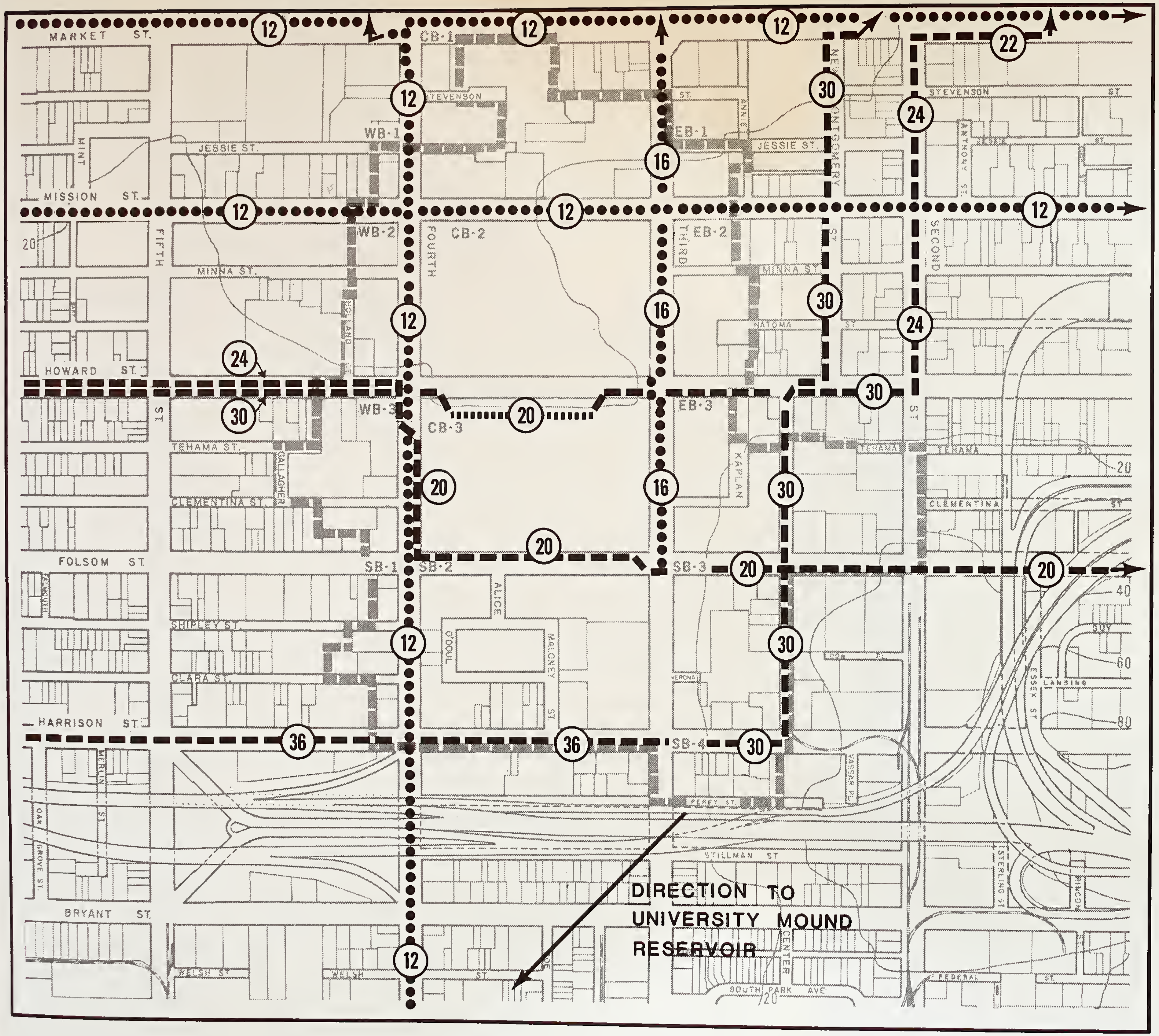
Temporary Main

Feeder Water Mains (>20")

Diameter of Main, Inches

* Water Main System from University Mound Reservoir

FEEDER MAIN SYSTEM	E-1



LEGEND

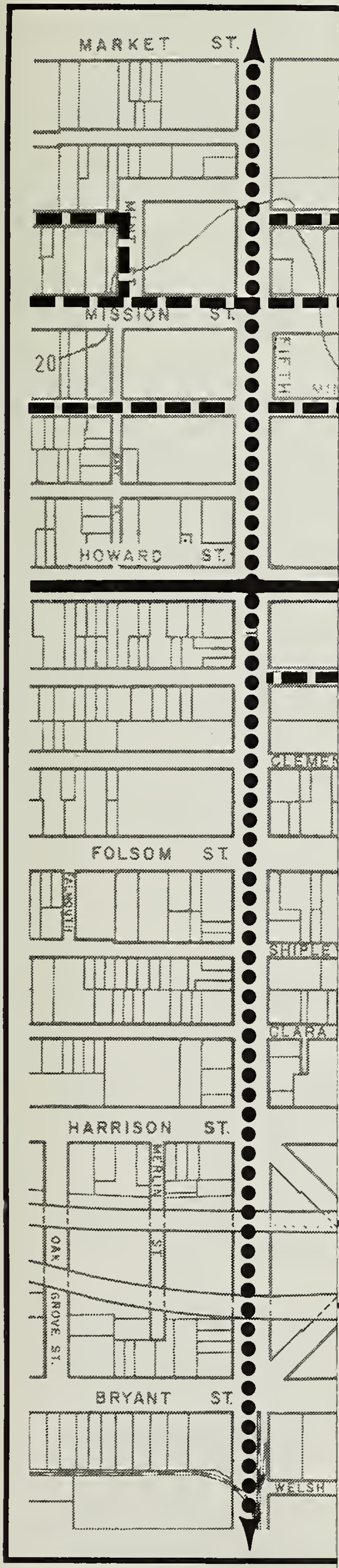
- Feeder Water Mains (<20")*
- Temporary Main
- Feeder Water Mains (>20")
- Diameter of Main, Inches

* Water Main System from University Mound Reservoir

0 — 0.5 Kilometer

0 — 1800 Feet

FEEDER MAIN SYSTEM	E-1



North Point Main, concrete, 8' diameter

Other concrete mains

Brick mains 3'x 5'

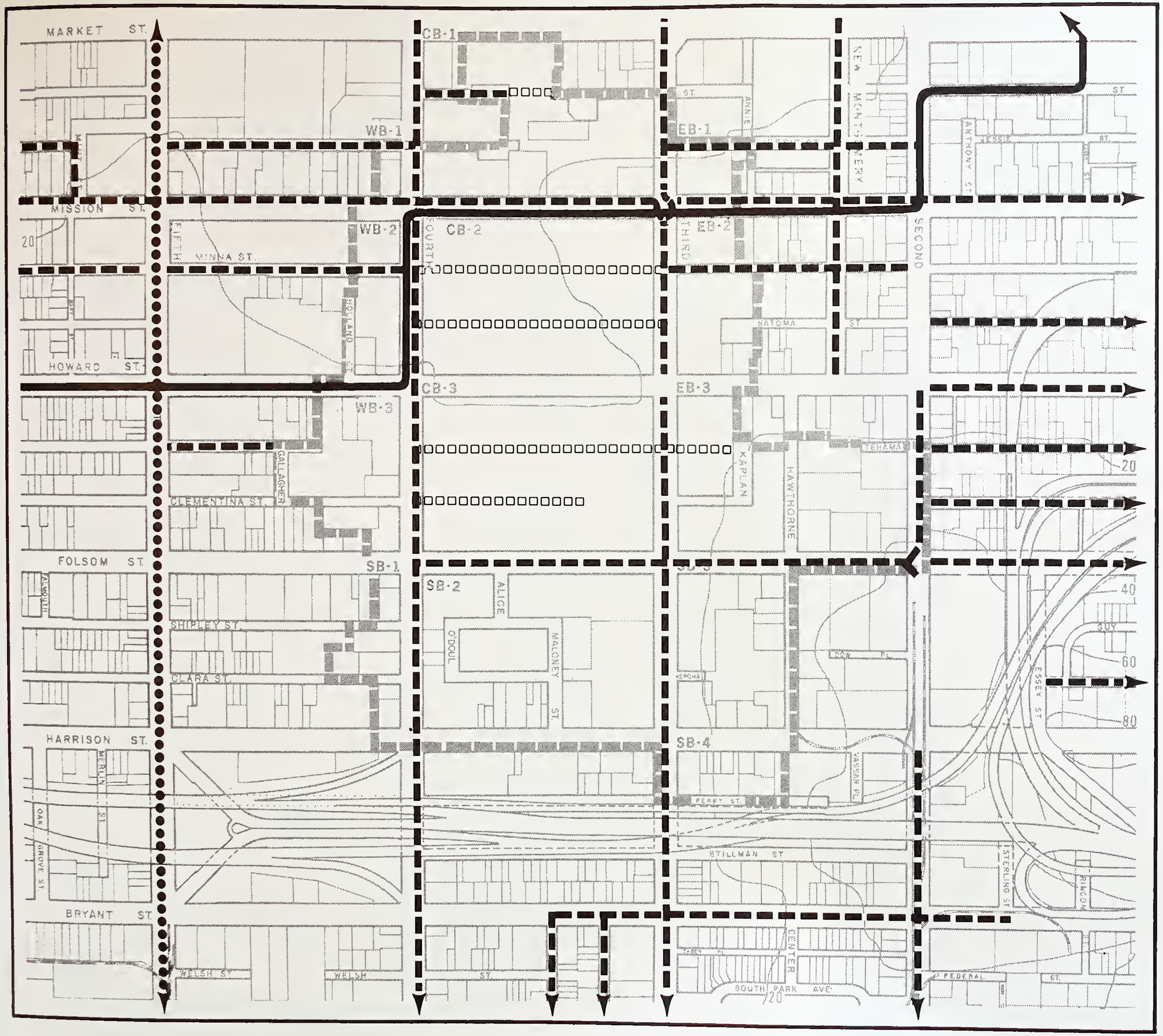
Mains under abandoned streets

N

0.5 Kilometer

1800 Feet

SEWERAGE LINES	E-2



LEGEND

North Point Main, concrete, 8' diameter

Other concrete mains

Brick mains 3'x 5'

Mains under abandoned streets

0 Kilometer 0.5

0 Feet 1800

SEWERAGE LINES	E-2

APPENDIX E, TABLE E-1
SEWAGE GENERATION CALCULATIONS FOR YBC: EXISTING AND COMMITTED

	Gallons/day	MGD/1/
Existing buildings remaining in 1980/2/	123,000	
Buildings now under construction:		
A.T. & T., 168,000 sq.ft./3/	11,500	
Gas Station/2/	700	
Downtown College Community Center 1,000 students (during a one-hour period) X 35 gpcd/4/	35,000	
TOTAL UNDER CONSTRUCTION:	47,200	0.047
TOTAL EXISTING AND NOW UNDER CONSTRUCTION:	170,200	0.170
1980 - COMMITTED CONSTRUCTION		
TODCO Housing 322 units X 100 gal/D.U./day/5/	32,200	
Mercantile Building		
9,000 sq.ft. retail-commercial X 200 gal/1,000 sq.ft./day/6/	1,800	
81,000 sq.ft. office X 125 gal/1,000 sq.ft./day	10,225	
	44,225	0.044
1980 - TOTAL EXISTING, NOW UNDER CONSTRUCTION, AND COMMITTED	214,400	0.214
1988 - COMMITTED CONSTRUCTION:		
1980 COMMITTED CONSTRUCTION	44,225	
TODCO Housing, 290 additional units X 100 gal/D.U./day/5/	29,000	
	73,225	0.073
1988 - TOTAL EXISTING, NOW UNDER CONSTRUCTION, AND COMMITTED	243,400	0.243

/1/Million gallons per day.
/2/From the records of the S.F. Water Dept. from June 1976 through May 1977.
/3/Based on sewage loads from the Pacific Telephone and Telegraph buildings at 370 Third St. and 666 Folsom St.
/4/Joint Committee of the American Society of Civil Engineers and the Water Pollution Control Federation, Design and Construction of Sanitary and Storm Sewers, 1969.
/5/Based on sewage loads generated by Clementina Towers housing for the elderly.
/6/Brown and Caldwell, Report on Wastewater Loadings from Selected Redevelopment Areas, February, 1972.

TABLE E-2 CALCULATIONS FOR DISCRETIONARY USE SEWAGE GENERATION, YBC: 1988

Type of Land Use	Estimating Factors /1/	Alternative A Unit	Alternative A Gals/Day	Alternative B Unit	Alternative B Gals/Day	Alternative C Unit	Alternative C Gals/Day	Alternative D Unit	Alternative D Gals/Day
Office	125 gal/1000 sq ft/day	6,214,450	776,750	2,631,625	329,000	1,302,300	195,300/2/	3,317,823	497,700/2/
Retail Commercial	200 gal/1000 sq ft/day	676,550	135,400	341,075	68,200				
Hotel Rooms	200 gal/room/day /3/	700 Rooms	140,000	----	----	----	----	----	----
Convention Facility	5 gal/visitor/day /4/ 20 gal/employee/day	2700 v/d /5/ 800 emp/day	13,500 16,000	2700 v/d 800 emp/day	13,500 16,000	---- ----	---- ----	---- ----	---- ----
Downtown Support	100 gal/1000 sq ft/day	----	----	----	----	----	----	6,336,584	633,660
Light Industrial	100 gal/1000 sq ft/day	1,077,450	107,700	342,875	34,280	359,378	35,900	1,551,704	155,170
Commercial Ent.	100 gal/1000 sq ft/day	400,000	40,000	----		----	----	----	----
Rec/Ent Park	5 gal/visitor/day	----	---	17800 v/d /6/	89,000	----	----	----	----
Housing: Family Market-Rate	200 gal/DU/day /3/ 200 gal/DU/day /3/	---- 50 DU	---- 10,000	300 DU 650 DU	60,000 130,000	300 DU 1000 DU	60,000 200,000	---- ----	---- ----
TOTAL GALLONS PER DAY: TOTAL (mgd) /7/:			1,239,350 (1.24 mgd)		739,980 0.740 mgd		491,200 (0.491 mgd)		1,286,530 (1.287 mgd)

/1/ Unless otherwise noted, taken from: Brown and Caldwell, Consulting Engineers, Report on Wastewater Loading from Selected Redevelopment Areas, February, 1972.
/2/ Combined office-retail commercial computed at 150 gal/1000 aq ft/day.
/3/ Metcalf and Eddy, Wastewater Engineering: Colllection, Treatment, Disposal, McGraw-Hill, 1972.
/4/ Estimating factor of 5 gallons per visitor per day provided by convention center architects.
/5/ High annual attendance figure of 985,000 visitors based on total annual 1976 attendance of 973,000 at similar Los Angeles Convention Center and estimated convention-use-only attendance figure of 475,000 in 1988 provided by R. Sullivan, General Manager, San Franciaco Visitora and Convention Bureau, telephone communication, August 22, 1977.
/6/ Based on high annual theme park attendance of 6,500,000 people estimated by R. Gryziec, letter dated July 26, 1977.
/7/ Million gallons per day.

(Units in square feet unless otherwise noted)

XIV. APPENDIX E: COMMUNITY SERVICE DETAILS

TABLE E-3 CALCULATIONS FOR DISCRETIONARY USE SOLID WASTE GENERATION, YBC: 1988

Type of Land Use	Estimating Factors /1/	Alternative A Unit	Alternative A Lbs/Day	Alternative B Unit	Alternative B Lbs/Day	Alternative C Unit	Alternative C Lbs/Day	Alternative D Unit	Alternative D Lbs/Day
Office	1 lb/100 sq ft/day	6,214,450	62,144	2,631,625	26,316	1,302,300	13,023	3,317,823	33,178
Retail Commercial	1 lb/100 sq ft/day	676,550	6,765	341,075	3,411				
Pedestrian Concourse	0.4 lb/100 sq ft/day/2/	163,220	653	80,720	323	80,720	323		
Hotel Rooms	2.4 lb/room/day	700 Rooms	1,680						
Convention Center	1 lb/100 sq ft/day	370,000	3,700	370,000	3,700				
Downtown Support	1 lb/100 sq ft/day							6,336,584	63,366
Light Industrial	2 lb/100 sq ft/day	1,077,450	21,549	342,875	6,858	359,378	7,188	1,551,704	31,034
Park	0.4 lb/100 sq ft/day/2/	454,000	1,817			908,600	3,634		
Commercial Entertainment	1 lb/100 sq ft/day	400,000	4,000						
Rec/Entertainment Park	0.8 lb/visitor/day /2/			7,800 v/d /3/	14,240				
Public & Downtown Spt. Pkg.	0.2 lb/100 sq ft/day		720	451,600	903	1,600	320	1,600	320
Housing: Family	2.4/lbs/capita/day x 2.25 capita/DU /4/			300 DU	1,620	300 DU	1,620		
Market Rate	2.4 lbs/capita day x 2.25 capita/DU /4/	50 DU	270	650 DU	3,510	1,000 DU	5,400		
TOTAL: (lbs. per day)			103,298		60,881		31,508		127,898
TOTAL: (tons per year)			18,850		11,110		5,750		23,300

/1/ Unless otherwise noted, taken from California Solid Waste Management Board, Technical Information Service Bulletin No 2, Solid Waste Generation Factors in California, July, 1974.
/2/ Based on estimates of solid waste generation in Union Square, provided by F. Garbarino, Office Manager, Golden Gate Scavenger Company, telephone communication, August 23, 1977.
/3/ v/d = visitors per day. High theme park attendance figures provided by R. Gryziec in a letter dated July 26, 1977.
/4/ Occupancy factor of 2.25 person/DU provided by T. Conrad, Chief Planner, S.F. Redevelopment Agency, telephone communication, August 17, 1977.

(Units in square feet unless otherwise noted)

4. MITIGATION: FIRE PROTECTION MEASURES TO BE INCORPORATED INTO THE DESIGN OF THE CONVENTION CENTER/1/

The following measures have been agreed to by the Fire Prevention Division and the convention center architects, although discussions are still in progress. The agreement would become a part of the building plans upon approval by the San Francisco Board of Examiners, and a judgment by the Board on any items in dispute.

- The building would be built of fire-resistant (Type I) construction materials.

- There would be a fire alarm system.

- A standby power supply on the premises would maintain power for lighting, fire alarm, voice communications, and sprinkler systems.

- An on-site fire brigade would be composed of trained employees.

- There would be a standpipe system in the building hooked directly into the domestic water supply system. A similar standpipe system would also be required on the site during construction. Full fire protection plans for the period of construction would be developed with the guidance of the Fire Department./2/

- The building would be fully sprinklered from the domestic water supply. Were the sprinkler system to come on, or be disconnected, an alarm would be activated at an on-site control room. Whether the alarm would be activated also at a central station (private firm) is still under negotiation between the Fire Marshal and the architects.

- The sprinkler system in the main Exhibit Hall would be designed to provide 0.30 gallons per minute (GPM) per sq. ft. over a 4,500 sq. ft. design area.

- There would be a large on-site water supply of approximately 200,000 gallons for fire-fighting uses with pump on emergency power./3/

- At least 50% of the Exhibit Hall exits would lead directly to the exterior of the building.

- At least four of the exits would be ramps. These would accommodate approximately 20% of the people in the main Exhibit Hall.

- Exhibits would not be allowed to block any exits, nor to interfere with the free flow of traffic to them.
- The building would be equipped with a smoke-removal system and the Fire Department would have the ability to control the exhaust and ventilation fans in this system.
- A central control station in the building would be provided for the exclusive use of the Fire Department while fighting a fire. It would be equipped with a communications system to each area of the convention center and a separate communications system for the use of the fire-fighting forces.
- Fuel for the emergency generator would be stored on the site.
- More exits from the main Exhibit Hall would be provided than are required by the Building Code.

FOOTNOTES

/1/ All information, except where noted, was supplied and reviewed by C.W. Carli, Fire Marshal, San Francisco Fire Department, personal interview, 12 August 1977 and letter dated September 6, 1977.

/2/ J. LaMarre, Project Director for YBC convention center, Turner Construction Company, telephone conversation, September 7, 1977.

/3/ M. Otsea, HOK (convention center architects), telephone conversation, September 7, 1977.

APPENDIX F: TRANSPORTATION METHODOLOGY AND SOME RESULTS

Basic Assumptions and Emphasis

- The street system would remain as it currently exists in terms of street alignment and configuration. That is to say, the present system of one-way and two-way streets and the related kinds of parking restrictions, traffic control devices, etc. are assumed to be in existence for the future time periods of analysis, 1980 and 1988. It is recognized that on-street parking in YBC would probably be reduced as development occurred./1/

- The capacity of the street system to handle vehicular traffic has been based upon the guidelines of the "Highway Capacity Manual"./2/ Further, the capacity of the sidewalk system to handle pedestrian traffic has been based upon existing effective widths and the guidelines in "Pedestrian Planning and Design"./3/

- Transit capacities have been based upon the existing configuration of equipment and schedules and the number of persons per vehicle seated and standing (where allowed by agency policy).

- Unavailability of information precluded estimating the future effects of changes in the transit agency capacities and operations. The analysis has assumed the current conditions as base conditions for 1988. The advent of Muni Metro would approximately double the capacity of the existing street car lines./4/ This change has been taken into account in the capacity analysis for the Market St. corridor, but not in the corresponding patronage analysis; the Municipal Railway has made no projections of patronage changes resulting from capacity increases.

- Travel projections have been made for 1980 and 1988 conditions in YBC. In 1980, the convention center would be fully developed; the remainder of the area would be partially developed. Full YBC buildout would be complete in 1988.

- A limited amount of public and private parking would be made available in YBC; any additional future long-term parking would be south of the project area in the vicinity of Harrison and Bryant Sts.

- Considerable emphasis has been placed on walking to and from the various uses in YBC. An average of at least 800 feet of walking distance has been assumed for access from transit to YBC land uses, with longer distances for travel from the

Southern Pacific Railroad, A-C Transit, BART, and Golden Gate Transit service at First St.

- o Market and Mission Sts. would continue to play major roles as transit-preferential streets serving the YBC area.

- o The growth of existing travel to 1980 and 1988 varies with the mode of transportation. Automobile travel in the area has been assumed to increase at a rate of 1.8% per year./5/

- o Transit in the area would continue to carry the existing level of ridership through 1988; YBC demands would be added to this.

Additional assumptions are stated below where applicable.

Analysis Methodology

For estimation of the amount of new travel (generated by YBC beyond current levels), trip generation rates were estimated for the various land use categories in the alternatives. A review of the literature/6/ established the trip generation factors shown in Table F-1. These were applied to the corresponding YBC land use designations to produce estimates of weekday and Saturday person trip-ends. (Trip-ends refer to two-way person travel. For example, each person patronizing a restaurant generates two trip-ends at the restaurant--one arrival and one departure.) Person trip-ends in Table F-1 include walking, transit and auto trip-ends. The resulting travel estimates are conservatively high because some of the trips generated (independently) for the retail uses would actually come from the trips generated for one or more of the other uses. Travel characteristics of the convention center and of the recreation/entertainment park were based on information provided by the architects responsible for the concept/design of each./7/

Three time periods for traffic setting and impacts were analyzed:

- o The hour from 4:30 to 5:30 p.m. on a weekday (mid-week).
- o The hour from 7:00 to 8:00 p.m. on a Friday.
- o The hour from 3:00 to 4:00 p.m. on a Saturday.

These time periods were selected to create situations in which the combination of the existing street traffic levels with the new traffic from YBC would produce the heaviest loadings. (Other periods (24-hour weekday, 6-9 a.m., 10 a.m.-6 p.m., 10 p.m.-7 a.m.) were analyzed to provide inputs for air quality and noise analysis.)

For each of the land uses, a percent of the total generation was assigned to each of the three time periods. The peak period percentages were developed from the trip generation literature./6/ (See also footnote 7). The p.m. peak hour percentages were reduced by 20% from what the literature indicated to adjust for the location of YBC in the metropolitan area. The reductions were necessary because the literature-based rates

APPENDIX F, TABLE F-1

TRIP GENERATION RATES FOR YBC*

LAND USE CATEGORY	PERSON TRIP-ENDS/DAY Weekday	Saturday
Convention Center	62,500**	0***
Commercial Entertainment	50/1000 sq. ft. GFS (Gross floor space)	75/1,000
Hotel	10.5/occupied room+	10.5
Retail	30/1,000 sq. ft. GFS	35/1,000
Office	12/1,000 sq. ft. GFS	1/1,000
Community Service	25/1,000 sq. ft. GFS	5/1,000
Light Industrial	8/1,000 sq. ft. GFS	1/1,000
Housing:		
Subsidized Elderly	3/D.U.	3/D.U.
Subsidized Family	6/D.U.	5/D.U.
Market-Rate	7/D.U.	6/D.U.
General Park	1.5/1,000 sq. ft. GFS	1.5/1,000
Downtown Support Service	6/1,000 sq. ft. GFS	1/1,000

*The recreation/entertainment park patronage characteristics are unique; they have been handled separately by direct estimation of traffic for the normal weekday peak hour and the (Friday) night and Saturday peaks. See Tables F-5 and F-11.
**The convention center has been assumed at the peak occupancy level of 24,000 persons for the weekday peak hour traffic analysis. It is recognized that this condition would occur only a few times per year if the estimated annual attendance of up to 500,000 persons holds true.
***Conventions normally run from Sunday through Thursday.
+80% occupancy assumed.

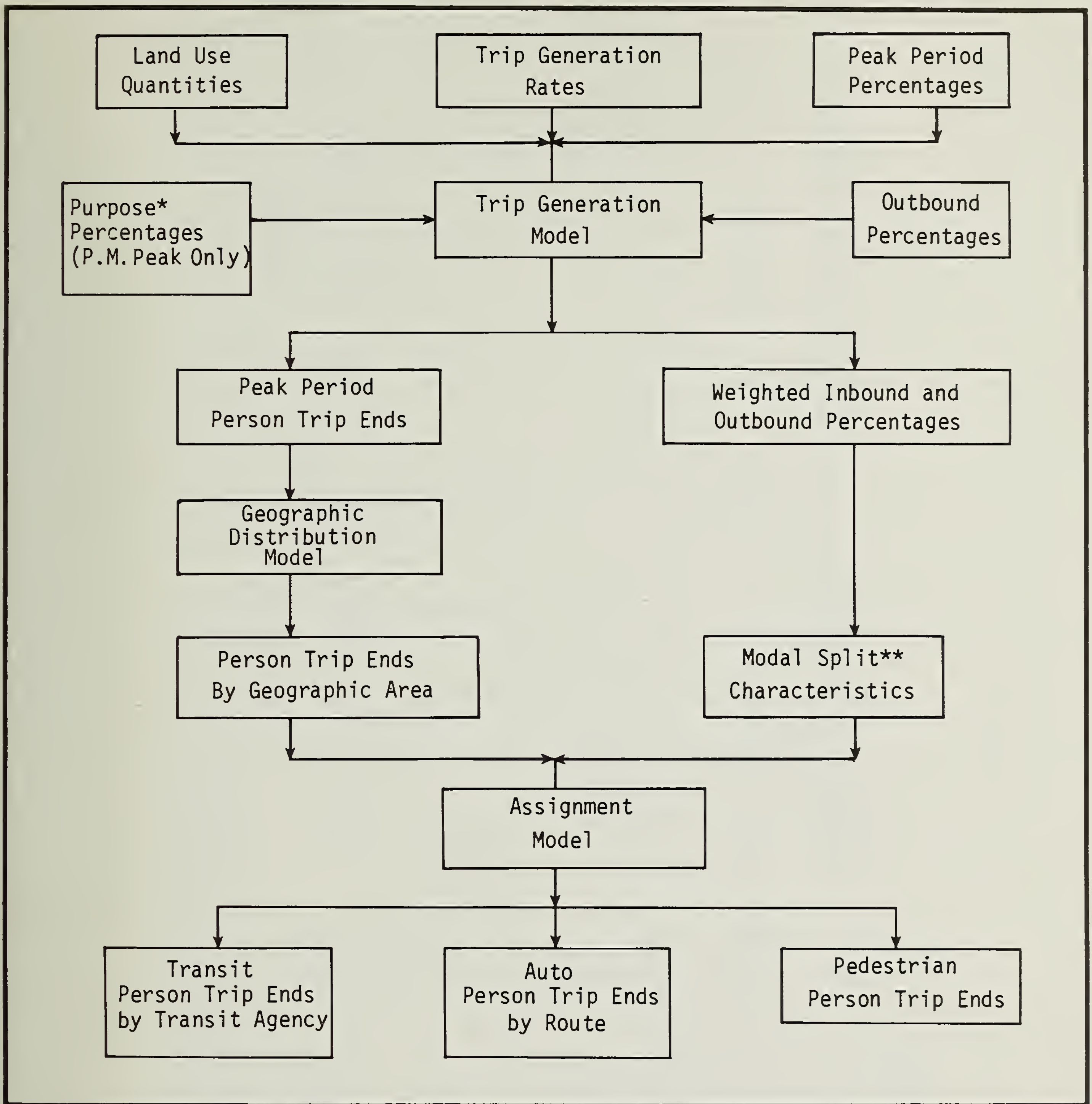
SOURCES: See footnote 6.

had been developed from studies done at non-central-city locations, which produce higher peaking rates (percentages of daily trips) than do major urban areas, such as YBC.

To facilitate assignment of traffic to each street, outbound (away from YBC) percentages were developed for each of the land uses. These percentages were developed from the trip generation literature./6/ (See also footnote 7).

Figure F-1 flow-charts the trip generation and assignment process. For each of the land use categories (exceptions: convention center and recreation/entertainment park), the quantity of units (GFS--gross floor space; DU--dwelling unit) was multiplied by the trip-generation rate, producing 24-hour person trip-ends (PTE). Peak hour PTE were calculated by multiplying by the peak hour percentages. Outbound peak hour PTE were calculated by multiplying by the outbound percentage. Convention center and recreation/entertainment park trips were supplied in a form that allowed them to be added directly to the peak hour trips from other generators, as well as to 24-hour totals. The PTE generated were summed over all the land use categories for the 24-hour, peak hour, and outbound peak hour PTE. For the purpose of assignment, the weighted percentages of inbound and outbound trips were calculated by dividing the total outbound peak hour PTE by the total peak hour PTE. Tables F-2 through F-13, pages 61 through 83, display the results of this process. Data are presented as they came out of the computer, except for the totals, which are rounded off.

Sufficiently detailed origin-designation and modal split data not being available, the traffic distribution and assignment model was developed as an aggregate rather than as a disaggregate model. An aggregate model is one in which large groups of people with similar characteristics are considered, whereas a disaggregate model considers groups of a much smaller size (one household, one person, for example). To develop and calibrate a disaggregate model requires voluminous origin/destination data usually collected at the home interview level. (For YBC, origin/destination data were required for the entire Bay Area. The last study that produced information on this scale was conducted in 1965 at a cost of $250,000 and took four years to finish.) Therefore, an aggregate model was developed in which all of the trips generated by YBC were considered to be one group. For this single group, origin-destination data and modal split data were available. To calibrate the model to reflect the Bay Area travel patterns, three trip purposes were used for the p.m. peak and one trip purpose for the night and weekend. For the p.m. peak, the trips would split 75% work (regular jobs in YBC), 20% non-work and 5% service. Service trips were considered to be all auto-oriented, whereas work trips were heavily transit oriented. For each of the trip purposes, a geographic distribution percent was developed as shown in Table F-14, page 84.



* Work, non-work, service

** Split between transit and auto, for example

FLOWCHART OF YBC TRAVEL DEMAND ANALYSIS FOR PEAK PERIOD	F-1

APPENDIX F, TABLE F-2

1980 ALTERNATIVES A AND B, WEEKDAY TRIP GENERATION

				P.M. Peak Hour				Night Hour			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE
Conv. Cent	--	--	62,500.	--	12,000.	100.	12,000.	--	6,000.	0.	0.
Retail	22,546.	.030	676.	6.5	44.	60.	26.	5.0	34.	40.	14.
Office	249,800.	.012	2,998.	14.5	435.	80.	348.	1.0	30.	50.	15.
Comty. Serv.	86,000.	.025	2,150.	4.0	86.	60.	52.	4.0	86.	20.	17.
Subs. Eld. Hsg.	322. (DU)	3.000 (Per DU)	966.	4.0	39.	20.	8.	1.0	10.	50.	5.
TOTAL			69,300.		12,600.		12,400.		6,160.		50.

Weighted Outbound Percent = 97.9
Weighted Inbound Percent = 2.1

Weighted Outbound Percent = 0.8
Weighted Inbound Percent = 99.2

P.M. Peak Hour 4:30 - 5:30 PM
Night Hour 7:00 - 8:00 PM

APPENDIX F, TABLE F-3

1980 ALTERNATIVES C AND D, WEEKDAY TRIP GENERATION

				P.M. Peak Hour				Night Hour			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE
Retail	22,546.	.030	676.	6.5	44.	60.	26.	5.0	34.	40.	14.
Office	249,800.	.012	2,998.	14.5	435.	80.	348.	1.0	30.	50.	15.
Comty. Serv.	86,000.	.025	2,150.	4.0	86.	60.	52.	4.0	86.	20.	17.
Subs. Eld. Hsg.	322. (DU)	3.000 (Per DU)	966.	4.0	39.	20.	8.	1.0	10.	50.	5.
TOTAL			6,790.		600.		430.		160.		50.

Weighted Outbound Percent = 71.8
Weighted Inbound Percent = 28.2

Weighted Outbound Percent = 31.7
Weighted Inbound Percent = 68.3

P.M. Peak Hour 4:30 - 5:30 PM
Night Hour 7:00 - 8:00 PM

APPENDIX F, TABLE F-4

1988 ALTERNATIVE A, WEEKDAY TRIP GENERATION

				P.M. Peak Hour				Night Hour			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE
Conv. Cen.	--	--	62,500.	--	12,000.	100.	12,000.	--	6,000.	0.	0.
Coml. Ent.	400,000.	0.050	20,000.	8.0	1,600.	20.	320.	20.0	4,000.	20.	800.
Hotel	700. (RMS.)	8.400 (Per RM.)	5,880.	12.0	706.	20.	141.	5.0	294.	60.	176.
Retail	639,096.	.030	19,173.	6.5	1,246.	60.	748.	5.0	959.	40.	383.
Office	6,464,250.	.012	77,571.	14.5	11,248.	80.	8,998.	1.0	776.	50.	388.
Comty. Serv.	86,000.	.025	2,150.	4.0	86.	60.	52.	4.0	86.	20.	17.
Light-Indst.	1,077,450.	.008	8,620.	12.0	1,034.	90.	931.	1.0	86.	50.	43.
Subs. Eld. Hsg.	612. (DU)	3.000 (Per DU)	1,836.	4.0	73.	20.	15.	1.0	18.	50.	9.
Mkt. Rt. Hsg.	50. (DU)	7.000 (Per DU)	350.	10.5	37.	20.	7.	2.0	7.	50.	4.
TOTAL			198,000.		28,000.		23,200.		12,200.		1,820.

P.M. Peak Hour: Weighted Outbound Percent = 79.6; Weighted Inbound Percent = 20.4

Night Hour: Weighted Outbound Percent = 14.9; Weighted Inbound Percent = 85.1

P.M. Peak Hour 4:30 - 5:30 P.M.
Night Hour 7:00 - 8:00 P.M.

APPENDIX F, TABLE F-5
1988 ALTERNATIVE B, WEEKDAY TRIP GENERATION

				P.M. Peak Hour				Night Hour			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE
Conv. Cen.	--	--	62,500.	--	12,000.	100.	12,000.	--	6,000.	0.	0.
Rec/Ent Park	--	--	*	--	730.	20.	146.	--	1,520.	20.	304.
Retail	363,671.	.030	10,910.	6.5	709.	60.	425.	5.0	546.	40.	218.
Office	2,881,425.	.012	34,577.	14.5	5,014.	80.	4,011.	1.0	346.	50.	173.
Comty. Serv.	86,000.	.025	2,150.	4.0	86.	60.	52.	4.0	86.	20.	17.
Lt. Indst.	342,875.	.008	2,743.	12.0	329.	90.	296.	1.0	27.	50.	14.
Subs. Eld. Hsg.	612. (DU)	3.000 (Per DU)	1,836.	4.0	73.	20.	15.	1.0	18.	50.	9.
Subs. Fam. Hsg.	210. (DU)	6.000 (Per DU)	1,260.	5.0	63.	20.	13.	2.0	25.	50.	13.
Mkt. Rt. Hsg.	650. (DU)	7.000 (Per DU)	4,550.	10.5	478.	20.	96.	2.0	91.	50.	46.
TOTAL			120,600.		19,500.		17,000.		8,660.		790.

P.M. Peak Hour: Weighted Outbound Percent = 83.9; Weighted Inbound Percent = 16.1

Night Hour: Weighted Outbound Percent = 9.2; Weighted Inbound Percent = 90.8

P.M. Peak Hour 4:30 -5:30 P.M.
Night Hour 7:00 - 8:00 P.M.

*Rec/Ent park has been factored directly into the P.M. peak hour and night hour.

APPENDIX F, TABLE F-6

1988 ALTERNATIVE C, WEEKDAY TRIP GENERATION

				P.M. Peak Hour				Night Hour			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE
Public Park	908,600	0.0015	1,363	9.0	120	60.	72.	-	-	-	-
Retail	220,841.	.030	6,625.	6.5	431.	60.	258.	5.0	331.	40.	133.
Office	1,353,805.	.012	16,246.	14.5	2,356.	80.	1,884.	1.0	162.	50.	81.
Comty. Serv.	86,000.	.025	2,150.	4.0	86.	60.	52.	4.0	86.	20.	17.
Lt. Indst.	359,378.	.008	2,875.	12.0	345.	90.	311.	1.0	29.	50.	14.
Subs. Eld. Hsg.	612. (DU)	3.000 (Per DU)	1,836.	4.0	73.	20.	15.	1.0	18.	50.	9.
Subs. Fam. Hsg.	300. (DU)	6.000 (Per DU)	1,800.	5.0	90.	20.	18.	2.0	36.	50.	18.
Mkt. Rt. Hsg.	1,000. (DU)	7.000 (Per DU)	7,000.	10.5	735.	20.	147.	2.0	140.	50.	70.
TOTAL			39,900.		4,240.		2,760.		800.		340.

Weighted Outbound Percent = 65.2
Weighted Inbound Percent = 34.8

Weighted Outbound Percent = 42.7
Weighted Inbound Percent = 57.3

P.M. Peak Hour 4:30 - 5:30 P.M.
Night Hour 7:00 - 8:00 P.M.

APPENDIX F, TABLE F-7

1988 ALTERNATIVE D, WEEKDAY TRIP GENERATION

				P.M. Peak Hour				Night Hour			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE
Retail	2,225,371.	.030	66,761.	6.5	4,339.	60.	2,604.	5.0	3,338.	40.	1,335.
Office	6,956,843.	.012	83,482.	14.5	12,105.	80.	9,684.	1.0	835.	50.	418.
Comty. Serv.	86,000.	.025	2,150.	4.0	86.	60.	52.	4.0	86.	20.	17.
Lt. Indst.	1,551,704.	.008	12,414.	12.0	1,490.	90.	1,341.	1.0	124.	50.	62.
Subs. Eld. Hsg.	612. (DU)	3.000 (Per DU)	1,836.	4.0	73.	20.	15.	1.0	18.	50.	9.
Dntn. Supt.*	621,338.	.006	3,728.	6.5	242.	60.	145.	0.0	0.	0.	0.
TOTAL			170,400.		18,300.		13,840.		4,400.		1,840.

P.M. Peak Hour	Night Hour
Weighted Outbound Percent = 75.5	Weighted Outbound Percent = 41.8
Weighted Inbound Percent = 24.5	Weighted Inbound Percent = 58.2

P.M. Peak Hour 4:30 - 5:30 P.M.
Night Hour 7:00 - 8:00 P.M.

*Services fraction only; equal to 10% of the downtown support area permitted by the zoning ordinance. Of the latter, 60% would be in office use (it is lumped with other office space above), and 30% would be in retail use (it is lumped with other retail space above).

APPENDIX F, TABLE F-8

1980 ALTERNATIVES A AND B, SATURDAY TRIP GENERATION

				Saturday Hour (3:00 - 4:00 P.M.)			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24 Hr.	Person TE	Outbound Percent	Outbound Person TE
Retail	22,546.	.035	789.	16.0	126.	50.	63.
Office	249,800.	.001	250.	10.0	25.	80.	20.
Comty. Serv.	86,000.	.005	430.	10.0	43.	60.	26.
Subs. Eld. Hsg.	322. (DU)	3.000 (Per DU)	966.	5.0	48.	50.	24.
TOTAL			2,440.		240.		130.

Weighted Outbound Percent = 54.9
Weighted Inbound Percent = 45.1

APPENDIX F, TABLE F-9

1980 ALTERNATIVES C AND D, SATURDAY TRIP GENERATION

				Saturday Hour (3:00 - 4:00 P.M.)			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24 Hr.	Person TE	Outbound Percent	Outbound Person TE
Retail	22,546.	.035	789.	16.0	126.	50.	63.
Office	249,800.	.001	250.	10.0	25.	80.	20.
Comty. Serv.	86,000.	.005	430.	10.0	43.	60.	26.
Subs. Eld. Hsg.	322. (DU)	3.000 (Per DU)	966.	5.0	48.	50.	24.
TOTAL			2,440.		240.		130.

Weighted Outbound Percent = 54.9
Weighted Inbound Percent = 45.1

APPENDIX F, TABLE F-10

1988 ALTERNATIVE A, SATURDAY TRIP GENERATION

				Saturday Hour (3:00 - 4:00 P.M.)			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24-Hr.	Person TE	Outbound Percent	Outbound Person TE
Coml. Ent.	400,000.	.075	30,000.	13.0	3,900.	50.	1,950.
Hotel	700. (RMS.)	8.400 (Per RM.)	5,880.	10.0	588.	40.	235.
Retail	639,086.	.035	22,368.	16.0	3,579.	50.	1,789.
Office	6,464,250.	.001	6,464.	10.0	646.	80.	517.
Comty. Serv.	86,000.	.005	430.	10.0	43.	60.	26.
Lt. Indust.	1,077,450.	.001	1,077.	10.0	108.	90.	97.
Subs. Eld. Hsg.	612. (DU)	3.000 (Per DU)	1,836.	5.0	92.	50.	46.
Mkt. Rt. Hsg.	50. (DU)	6.000 (Per DU)	300.	9.0	27.	50.	14.
TOTAL			68,400.		8,980.		4,670.

Weighted Outbound Percent = 52.0
Weighted Inbound Percent = 48.0

APPENDIX F, TABLE F-11

1988 ALTERNATIVE B, SATURDAY TRIP GENERATION

				Saturday Hour (3:00 - 4:00 P.M.)			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24 Hr.	Person TE	Outbound Percent	Outbound Person TE
Rec/Ent Park			*		3,260.	50.	1,630.
Retail	363,671.	.035	12,728.	16.0	2,037.	50.	1,018.
Office	2,881,425.	.001	2,881.	10.0	288.	80.	231.
Comty. Serv.	86,000.	.005	430.	10.0	43.	60.	26.
Lt. Indst.	342,875.	.001	343.	10.0	34.	90.	31.
Subs. Eld. Hsg.	612. (DU)	3.000 (Per DU)	1,836.	5.0	92.	50.	46.
Subs. Fam. Hsg.	210. (DU)	5.000 (Per DU)	1,050.	5.0	53.	50.	26.
Mkt. Rt. Hsg.	650. (DU)	6.000 (Per DU)	3,900.	9.0	351.	50.	176.
TOTAL			23,200.		6,160.		3,180.

Weighted Outbound Percent = 51.7
Weighted Inbound Percent = 48.3

*Recreation/Entertainment Park trips have been factored directly into the peak hour.

APPENDIX F, TABLE F-12

1988 ALTERNATIVE C, SATURDAY TRIP GENERATION

				Saturday Hour (3:00 - 4:00 P.M.)			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24 Hr.	Person TE	Outbound Percent	Outbound Person TE
Public Park	908,600	.0015	1,363	10.0	136.	50.	68.
Retail	220,841.	.035	7,729.	16.0	1,237.	50.	618.
Office	1,353,805.	.001	1,354.	10.0	135.	80.	108.
Comty. Serv.	86,000.	.005	430.	10.0	43.	60.	26.
Lt. Indst.	359,378.	.001	359.	10.0	36.	90.	32.
Subs. Eld. Hsg.	612. (DU)	3.000 (Per DU)	1,836.	5.0	92.	50.	46.
Subs. Fam. Hsg.	300. (DU)	5.000 (Per DU)	1,500.	5.0	75.	50.	38.
Mkt. Rt. Hsg.	1,000. (DU)	6.000 (Per DU)	6,000.	9.0	540.	50.	270.
TOTAL			20,600.		2,290.		1,210.

Weighted Outbound Percent = 52.7
Weighted Inbound Percent = 47.3

APPENDIX F, TABLE F-13

1988 ALTERNATIVE D, SATURDAY TRIP GENERATION

				Saturday Hour (3:00 - 4:00 P.M.)			
Land Use	Sq. Ft.	Person TE/Day Per Sq. Ft.	24-Hour Person TE	% of 24 Hr.	Person TE	Outbound Percent	Outbound Person TE
Retail	2,225,371.	.035	77,888.	16.0	12,462.	50.	6,231.
Office	6,956,843.	.001	6,957.	10.0	696.	80.	557.
Comty. Serv.	86,000.	.005	430.	10.0	43.	60.	26.
Lt. Indst.	1,551,704.	.001	1,552.	10.0	155.	90.	140.
Subs. Eld. Hsg.	612. (DU)	3.000 (Per DU)	1,836.	5.0	92.	50.	46.
Dntn. Supt.*	621,338.	.001	621.	10.0	62.	50.	31.
TOTAL			89,300		13,500.		7,030.

Weighted Outbound Percent = 52.0
Weighted Inbound Percent = 48.0

*Services fraction only; equal to 10% of the downtown support area permitted by zoning ordinance. Of the latter, 60% would be in office use (it is lumped with other office space above), and 30% would be in retail use (it is lumped with other retail space above).

APPENDIX F, TABLE F-14

TRIP DISTRIBUTION FOR YBC (Percent of total person movements)

GEOGRAPHIC AREA	PURPOSE				
	WORK		NON-WORK*	SERVICE*	NIGHT
	1980	1988			
North Bay (Marin and Sonoma Counties)	6.5	6.4	2		2
Peninsula (San Mateo, San Jose & South)	17.8	19.6	12		13
East Bay (Bay Bridge)	13.6	14.0	11		11
Downtown/Northeast San Francisco (East of Van Ness, North of Market to the Embarcadero & South of Market to 101)	16.1	15.6	23**	50	38**
Northwest San Francisco (Richmond, Marina and Western Addition)	17.4	16.8	21		15
Southwest San Francisco (Sunset, Parkside, Mission, Ingleside, Excelsior, Twin Peaks, and Upper Market)	22.4	21.6	15	50	10
Southeast San Francisco (Hunters Point, East and South of 101)	6.2	6.0	16	___	11
TOTAL	100	100	100	100	100

*Distributions for these purposes are applicable for both 1980 and 1988.
**For some special uses, such as the recreation/entertainment park, attracting pedestrians from other nearby uses, the downtown additions would be higher. That use is about 15% of the YBC total development area.

SOURCES: "Transportation Conditions and Trends", San Francisco City Planning Department, 1976.

Transbay Terminal "Alternate Analysis and Patronage Update" DMJM, 1976

"Bay Area Transportation Study" 1980 Projections (BATS), 1965;some data and techniques that have not been updated formally are judged by TJKM to be still relevant.

"Series 2 Projections" Appendix A, ABAG, 1973.

A modal split for each of the geographic areas was developed (Table F-15). The percentages were based upon estimates of existing and/or future population distribution, available modes and patronage characteristics on these modes. A switch from auto to transit by some commuters between 1980 and 1988 was assumed for those geographic origins whose routes contain bottlenecks (bridges, freeways) that are at, or reaching, capacity. San Francisco drivers are not so limited in their choice of routes; therefore no change in the auto/transit split for San Francisco origins was assumed.

Assignment of the trips to available modes and routes was done on the basis of the geographic distribution percentages and the outbound and inbound percentages. All of the non-pedestrian travel, as identified by origin/destination and mode, was assigned to corresponding transit lines and auto routes. The assignment of autos to routes was on the assumption that most auto parking would occur outside of YBC.

The analyzed principal modes of travel were walking, transit, and automobile. Secondary mode considerations involved taxis, jitneys, charter buses, and travel of commercial vehicles for service and delivery of goods.

Pedestrian travel was assumed to be principally by residents and workers within the area to functions within the area, plus that travel from within the area to automobile parking and to transit lines in and around the area. Calculation of pedestrian travel in the YBC area involved assignment of the pedestrians to external attractors (transit terminals, parking areas, hotel areas) as indicated by the distribution/modal-split/ assignment model. Once the trips were assigned externally, they were traced into the YBC area and overlaid to produce a composite flow pattern for pedestrian travel. Assignment to internal YBC routes considered the location of each land use with respect to pedestrian generation.

● Recognizing that the people using the convention center would be following slightly different travel patterns than the other YBC users, the assignment process treated this contingent of the YBC user population separately. What is not shown in the trip generation tables in Tables F-2, F-4 and F-5 is the split between pedestrian and vehicular-based trips for convention center users. Of the 12,000 person trip-ends from the convention center in the P.M. peak hour, apprximately 4,400 trip-ends have been assigned as pedestrian trips <u>only</u>. The remaining 7,600 trip-ends have been assigned as vehicular-based trips. The modal split and geographic percentages are the ones shown in Tables F-14 and F-15. Hence, these trips were assigned in the same way as the non-convention-center trips.

The amount of travel related to service and delivery by commercial vehicles in the area was treated separately and was not a part of the basic modal-split analysis.

APPENDIX F, TABLE F-15

MODAL SPLIT (%) FOR YBC (PERSON TRIPS)

GEOGRAPHIC AREA	MODE	PURPOSE: WORK 1980	WORK 1988	NON-WORK**	SERVICE**	NIGHT 1980	NIGHT 1988
North Bay	Auto	65	62	73	--	100	95
	Bus*	30	33	19	--	--	5
	Ferry*	5	5	8	--	--	--
Peninsula	Auto	75	66	80	--	100	95
	SPRR*	9	13	17	--	--	--
	SAMTRANS	16	21	3	--	--	5
East Bay	Auto	44	40	85	--	95	90
	Bus*	30	31	4	--	--	--
	BART	26	29	11	--	5	10
Downtown/North-east San Francisco (Table F-14)	Auto	34	34	40	100	85	80
	Muni	66	66	50	--	10	15
	Walk***	--	--	10	--	3	3
	Taxi	--	--	--	--	2	2
Northwest San Francisco (Table F-14)	Auto	37	37	55	--	85	85
	Muni	63	63	45	--	15	15
Southwest San Francisco (Table F-14)	Auto	37	37	55	100	85	80
	Muni	50	50	36	--	10	10
	BART	13	13	9	--	5	10
Southeast San Francisco (Table F-14)	Auto	47	47	60	--	85	85
	Muni	53	53	40	--	15	15

*Access to these modes is a combination of Muni, walking, jitney, and taxi.
**Modal splits for these purposes are applicable to both 1980 and 1988.
***Walking to the convention center and to the recreation/entertainment park was treated separately, as were taxi trips to these uses.

SOURCES: "Transportation Conditions and Trends", San Francisco City Planning Department, 1976
Transbay Terminal "Alternate Analysis and Patronage Update", DMJM, 1976
"Bay Area Transportation Study" 1980 projections (BATS), 1965; see note on Table F-14 source reference.

Parking that would be provided within YBC was assumed to include that public and private parking as proposed, and as required and/or permitted by the uses shown in Tables 1(text) and A-1 (Appendix A). Required and/or permitted parking was based on the planning code and master plan policies. C-3-0, C-3-R, and C-3-S zones require parking to be provided only for housing. Conditional use provisions allow parking for the other uses. For example, M-1 zones require parking for office, retail, service and light industrial uses. No housing is allowed in M-1 zones with the exception of the YBC (redevelopment) area. Hence there are no statutory parking requirements for housing in the M-1 zones in YBC.

From the above requirements and conditional uses, parking supply was calculated on the basis of the following rates.

In the C-3-0, C-3-R, C-3-S zones:

- o 1 parking space for each market-rate and subsidized family dwelling unit that has two or more bedrooms.
- o 2 parking spaces for every 3 market-rate and subsidized family dwelling units that have 1 bedroom.
- o 2 parking spaces for every 5 market-rate and subsidized family dwelling units that have no bedrooms.
- o One-half the above spaces for subsidized elderly housing.
- o 15 spaces or 7% of the proposed gross floor space (whichever is larger) for parking, for uses other than the convention center, hotel and housing. 1 space for each 350 sq.ft. was used. (No spaces were provided for the convention center or the hotel).

In the M-1 zone:

- o 1 space for every 500 sq.ft. of gross floor space (GFS) for offices with greater than 5,000 sq.ft. of GFS.
- o 1 space for every 500 sq.ft. of GFS for retail uses with greater than 5,000 sq.ft. of GFS but less than 20,000 sq.ft.
- o 1 space for every 250 sq.ft. of GFS for retail uses with GFS in excess of 20,000 sq.ft.
- o 1 space for every 1,000 sq.ft. of GFS for service uses.
- o 1 space for every 1,500 sq.ft. of GFS for light industrial uses.
- o The housing rates for the C-3-0, C-3-R and C-3-S zones were assumed to apply, with the exception of the subsidized elderly housing, for which no parking was assumed in the M-1 zone.

The parking demand was calculated starting with the 24-hour person trip-ends in autos. The 24-hour person trip-ends were adjusted by factors for vehicle occupancy (persons per vehicle), daytime proportion of total daily trips, and parking space turnover (average number of times per day each daytime space is used) as shown in the following equation:

Parking Demand = ((person trip-ends ÷ vehicle occupancy) ÷ 2 trip-ends x (daytime per trip proportion ÷ turnover))

The values for the above factors (Source: See footnote 5) are:

o Vehicle occupancy = 1.4 persons per vehicle

o	Daytime proportion for	work trips	= 0.75
		non-work trips	= 0.50
		service trips	= 0.40
o	Turnover rates for	work trips	= 1.5
		non-work trips	= 5.0
		service trips	= 2.0

Nighttime demand would be less than daytime demand.

● The average of 1.4 occupants per auto is used by the Transportation Planning Section of the Department of City Planning as a reasonable figure for downtown San Francisco. An independent assessment by the EIR consultants showed that it was reasonable also for the traffic generated by future YBC development under the four alternatives and the Redevelopment Agency tentative proposal, in that it is based on a 1970 City survey in the downtown area. While it is true that vehicle occupancy for visits to the recreation/entertainment park, for example, would be expected to be higher than 1.4 persons, occupancy for trips to the office uses would be expected to be closer to 1.0. Within the accuracy of the overall traffic analysis, a weighted average of 1.4 over all proposed land uses within YBC is reasonable, particularly for the peak hour, which was the basis for the traffic analysis.

● The transit analysis was done at principal surrounding cordon (check) points (representative points, encircling YBC, at which inbound or outbound trips were summarized in existing transit patronage studies) for Muni, SamTrans, and Golden Gate Transit, and at the specific points of loading for the other transit modes: BART, A-C Transit, and Southern Pacific Railroad. The analysis procedure determined the capacity of the transit lines at these cordon points. The total loadings on the systems for future years were estimated by summation of the existing loading and the estimated YBC additional patronage. The assumption that non-YBC-development transit ridership would remain the same was related to other factors. For purposes of analysis, the assumption was made that citywide levels of service (independent of YBC development) would remain through 1988 as they were in 1977; that is, that capacity would be adjusted to meet (non-YBC-development) demand. For analysis of the effect of YBC increments, this is equivalent to assuming constant capacity and constant (non-YBC) demand, as was actually done in the DEIR calculations of demand/capacity ratios. Those calculations actually gave worst-case ratios

(the ratios would have been lower if citywide capacity and [non-YBC] demand had both been allowed to grow for the calculations). No inference was made as to the actual state of transit patronage in 1988. The transit mode demand splits for Golden Gate Transit, Southern Pacific Railroad, SamTrans, A-C Transit and BART were assumed to increase between 1980 and 1988. The rationale for these increases is based on the fact that each of these agencies serves an area external to San Francisco. For each of these areas, access to San Francisco is via well-defined auto corridors (Golden Gate and Bay Bridges, Bayshore Freeway, etc.) which are currently operating near capacity/8/ in the peak periods. The future modal split takes account of the likelihood that as the auto routes become more congested (for longer periods of time) some shift to transit will occur. This has not been assumed for the areas (transit agencies) internal to San Francisco, as a multiplicity of parallel routes exist for auto travel. With many parallel routes, the congestion would cause the autos to spread over distance to other routes rather than spread over time; thus, no shift to transit would be forced by traffic growth.

The transit analysis was for the peak two-hour period from 4:00 to 6:00 p.m. because patronage analysis studies have been done in these terms for the transit agencies. As the trip generation produced one-hour travel (4:30 to 5:30 p.m.) rather than two-hour travel (4:00 to 6:00 p.m.), an expansion factor of 1.67 was used to increase the one-hour transit travel to the two-hour level. This expansion factor was developed from analysis of the peaking characteristics of existing transit ridership on all of the transit modes. Note that for shorter time periods within the

[Text continues on page 89.]

peak period (i.e., peak one-half hour or peak five minutes) the seated capacities are exceeded by 50 to 100% on some transit lines, for example BART Transbay, as indicated by an April 1977 study./9/ A similar analysis was done for the night hour from 7:00 to 8:00 p.m. (use of the expansion factor was not necessary for this analysis).

- For the P.M peak transit capacity and demand analysis of the DEIR, a two-hour period was the basis. A two-hour period is the standard for collection of monthly data by most transit agencies. The DEIR recognized (p. 329, Appendix pp. 88-89) that the Muni system, for example, was at or above capacity for periods of the order of 15 minutes or longer, but noted the lack of data over such short time periods. From a transit-system-design point of view, it is not practical to design to meet the (short) peak periods of the peak demands. That is, it would be unreasonably expensive to provide enough vehicles to meet the short-peak demands; this is the reason for the collection of data on a two-hour basis.

- In addition, in general the collection of data for the peak of the peak would itself be an unreasonably expensive task. Some idea as to the cost of the <u>normal</u> two-hour data collection is of interest here. The Planning-Operations-Marketing study commissioned by the MUNI in 1975 (which was the DEIR's data source) was the most recent study of this magnitude for the MUNI. The study was conducted to gather a broad base of information concerning ridership characteristics as well as provide a basis for future route design. The entire study cost approximately $300,000 and the on-board survey which provided the demand data in Table 15 of the DEIR cost $70,000 of the total. In the opinion of the MUNI (T. Standing, telephone communication, February 23, 1978), the approximate cost for a study to determine the citywide peak-of-the-peak conditions would be one million dollars. Institution of such a study would be made by Mr. Curtis Green, General Manager of the MUNI.

- Of all the agencies included in the transit analysis, only two had information available that identified the peak-of-the-peak conditions. Those agencies were AC Transit and BART. AC transit has a continuing program of comprehensive counts at the Bay Bridge conducted under the auspices of a federally funded BART impact program. The ITS Traffic Survey Report A-48 (Footnote 9, p. 92, Appendix F) is the result of this program. BART has data available from its Data Acquisition System (DAS) which monitors entries and exits from BART stations. The DAS is a computer tally of exits at each station broken down by point of entry into the BART system. The results of the tallies can be broken down to five-minute intervals. A system of this type is unique to BART of all the local agencies.

Demand/capacity ratios, expressed in percent of existing capacity, were calculated for p.m. peak and nighttime periods for the existing, 1980, and 1988 conditions.

For the mixed-vehicle (non-transit: includes cars and trucks) analysis, ten intersections through which most of the traffic passes were used for the impact assessment. At each of the ten intersections, average vehicle headways (the average time intervals between vehicles entering an intersection) for the existing, 1980 and 1988 p.m. peak and nighttime

conditions were calculated with the "critical lane" method of analysis. The "critical lane" method of intersection analysis is a technique for calculating the level of service (a measure of congestion) for an intersection as a whole rather than calculating the level of service on each approach separately (Highway Capacity Manual method)./2/ The results from the "critical lane" calculations are in terms of either vehicular flow (vehicles per hour) or its inverse or reciprocal, vehicular headway (seconds per vehicle).

Analysis of an intersection by the "critical lane" method consists of calculating the maximum vehicular volume in each lane on each approach to an intersection for a predetermined time period (15 minutes, 1 hour, etc.,) for each phase of the signal timing. (A phase is a specific setting of the entire signal array--green, red, green arrow--for a specific time interval). The conflicting approaches and phases are determined from the signal timing and intersection geometry. The maximum lane volumes for the conflicting approaches are summed, giving the average vehicular flow through the intersection. The average vehicular headway is calculated by inverting the flow (taking its reciprocal) and multiplying by the appropriate conversion factors. A simplified example of this method is shown in Figure F-2.

For estimation of future traffic, the base traffic (existing) was increased by a downtown growth factor of 1.8% per year (See footnote 5 for source) to give the future level in 1980 or 1988, and the new traffic generated by each YBC alternative was added. The p.m. peak hour analysis required the use of peak 15-minute factors from existing traffic data. These factors were then applied to the total calculated hourly traffic to give the 15-minute approach volumes at the intersections. The guideline headways are minimum (design) values/10/; they vary because of the difference in pedestrian volumes at each intersection. (The higher the pedestrian flow at an intersection, the higher the vehicle guideline headway; that is, fewer vehicles can pass through an intersection that has high pedestrian volumes). Actual headways larger than the guideline values indicate better conditions than Level of Service "D".

Assignment of generated traffic to YBC streets depends on location of parking. The assumption was made that the principal amount of available long-term parking would be outside YBC, adjacent to the southerly YBC boundary in the vicinity of Harrison St. and of Bryant St.

[Text continues on page 90.]

For the evening peak hour, less than about 10% of Third St. traffic was assigned to Market and Mission Sts., recognizing the fact that these are preferential streets for transit flow, and thus less attractive to regular auto commuters. Regular commuters to the north would tend to use routes such as the Bush/Pine pair. Since most of the parking is southerly of YBC, the Howard/Folsom and Harrison/Bryant pairs would be more attractive than Market and Mission Sts.

Sensitivity

The traffic impact analysis was based upon the various estimates for land use allocation and amount of gross floor area or number of dwelling units associated with each alternative. The travel estimates are sensitive to changes in the projected developmental figures. The impact analysis is sensitive also to parking price structures and fuel availability and cost, all of which affect the auto mode split.

The impact analysis for both transit and mixed vehicles is sensitive to future traffic management changes in the South-of-Market area. These changes could take the form of increased development of transit preferential streets and further restrictions of on-street parking in order to facilitate general vehicle flow.

The transit impact analysis is sensitive to future changes in the agencies' operating characteristics. Increases in capacity (service), such as for the Muni Metro, could reduce dependence on the auto.

The impact analysis is sensitive also to the general increase in intensity of land use south of Market St., with a resulting increase in pedestrian volumes. As previously noted, pedestrian volumes affect the intersection capacity. Of more importance is the impact of congestion on the movements and safety of pedestrians themselves.

In the judgment of the TJKM traffic engineers (in the light of the above uncertainties, the quality of the available data, and the type of trip-generation model used), the overall accuracy of the travel demand projections is in the range of ± 10-15%.

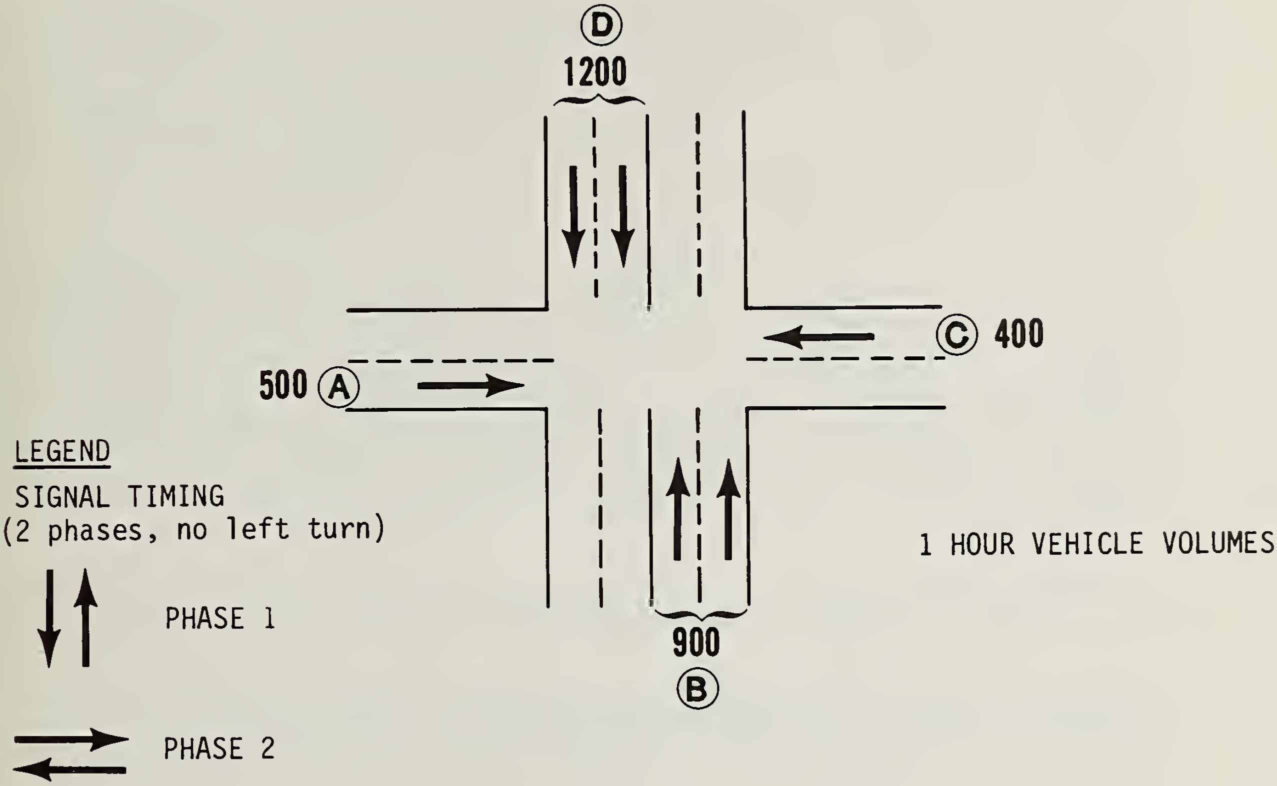
The incremental effects of YBC development appear relatively small because the base travel demand levels are high. The total relative measures of congestion, for example, appear very close for Alternatives A, B, C and D, while the (incremental) differences in traffic volumes among them are great.

FOOTNOTES

/1/ S. Shoaf, San Francisco Department of Public Works, Bureau of Traffic Engineering, telephone communication, November 9, 1977.

/2/ Highway Research Board, 1965, Highway Capacity Manual 1965, Special Report 87, National Academy of Sciences, National Research Council Publication 1328.

FIGURE F-2: EXAMPLE CALCULATION OF "CRITICAL LANE" METHOD



Maximum Lane Volumes

Approach	A	500	vehicles	÷ 1 lane	= 500 veh/ln
	B	900	"	÷ 2 lanes	= 450
	C	400	"	÷ 1 lane	= 400
	D	1200	"	÷ 2 lanes	= 600

For 2 phases, only 2 approaches can conflict: for Phase 1 the maximum (critical) lane volume is on Approach D, and for Phase 2 the maximum (critical) lane volume is on Approach A.

Critical Lane vehicular volume through intersection =
600 veh/ln + 500 = 1100 veh.

Average Vehicular Headway =
(1 Hour ÷ 1100 vehicles) x 3600 seconds per hour = 3.3 seconds/vehicle.

If the analysis (vehicle volume) is for the peak 15 minutes, the factor changes from 3600 to 900.

/3/ Fruin, John J, 1971, Pedestrian Planning and Design, Metropolitan Association of Urban and Environmental Planners, New York.

/4/ G. Cauthen, Senior Civil Engineer, San Francisco Muni, telephone communication, August 18, 1977.

/5/ This rate is the one used in the 1970 San Francisco Downtown Parking and Traffic Survey (DPATS), San Francisco Department of Public Works. As the peak hour traffic volumes reach capacity, any growth in vehicle flow beyond that point would not be possible. Either the peak hour would broaden to include other adjacent hours or there would need to be a shift to other modes of travel than the automobile.

/6/ The literature reviewed included: California Department of Transportation (CALTRANS), District 04, 1966-1976, Trip End Generation Research Counts Progress Reports, Repts. 1-11; Institute of Transportation Engineers (ITE), 1976, Trip Generation, ITE Informational Report; National Cooperative Highway Research Program (NCHRP), 1969, Urban Travel Patterns for Hospitals, Universities, Office Buildings, and Capitols, Rept. No. 62; NCHRP, 1971, Projection of Highway Utility, Trip Generation Vocabulary, Rept. No. 121; TJKM, 1974, City of Sausalito Comprehensive Traffic Study.

/7/ Convention center: J.E. MacArthur of Hellmuth, Obata and Kassabaum, Inc. (HOK); recreation/entertainment park: R. Gryziec, Architect/Planner.

/8/ A recent study (Trends in Traffic Patterns at the Bay Bridge and Caldecott Tunnel, University of California (Berkeley) Institute of Transportation Studies, 1977) indicates that the Bay Bridge is operating at capacity for short periods of time during each peak period. Similar situations are occurring on the major auto corridors.

/9/ University of California (Berkeley) Institute of Transportation Studies, 1977, Traffic Survey Series A 48.

/10/ The guideline headway represents "critical lane" volume or the intersection "capacity" at Level of Service "D". (Under Level "D" (Highway Capacity Manual, op. cit.) "delay is substantial during short peaks within the peak period, but there is enough time with lower demand to permit periodic clearance of queues.") A demand/capacity ratio could be used as an equivalent to headway. This may be easier to understand.

Example: A 2.6 second headway with moderate pedestrian traffic is the same as a demand of 1,400 vph. "Capacity" at Level of Service "D" is 1,200 vph, which is the same as a headway of 3.0 seconds. The demand capacity ratio would be: 1,400/1,200 = 1.17. This is equivalent to comparing a 2.6 second actual headway with a guideline headway of 3.0 seconds.

APPENDIX G: CLIMATE AND AIR QUALITY REFERENCE DATA AND METHODS

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1. CLIMATE AND AIR QUALITY SETTING

CONTENTS

CLIMATE SETTING

AMBIENT AIR QUALITY SETTING

APPENDIX G, TABLE G-1

SUMMARY OF SAN FRANCISCO TEMPERATURE,* DEGREES FAHRENHEIT

	DAILY MAXIMUM	DAILY MINIMUM	DAILY AVERAGE
January	56	46	51
February	59	48	53
March	60	49	54
April	61	49	55
May	62	51	57
June	64	53	58
July	64	53	58
August	65	54	59
September	69	55	62
October	68	54	61
November	63	51	57
December	57	47	52
Annual Average	62	51	56

*Temperatures shown are based on records from 1941 through 1976.

SOURCE: Climatological Data, Annual Summary with Comparative Data, 1976, National Oceanic and Atmospheric Administration.

APPENDIX G, TABLE G-2

SUMMARY OF SAN FRANCISCO PRECIPITATION, INCHES OF RAIN

	1974	1975	1976*	NORMAL TOTAL**
January	3.40	2.57	0.31	4.51
February	1.53	3.72	1.83	2.97
March	4.49	5.15	1.01	2.77
April	2.34	1.25	0.70	1.63
May	0.00	0.02	0.01	0.54
June	0.10	0.04	0.03	0.17
July	0.62	0.20	0.00	0.01
August	0.00	0.02	0.78	0.05
September	0.00	0.00	0.51	0.17
October	0.85	2.44	0.38	1.06
November	0.40	0.43	1.04	2.60
December	1.53	0.18	2.13	4.18
Annual Total	15.26	16.02	8.73*	20.66

*Note drought conditions exist for 1976 data.
**Climatological Norm based on data 1941-1976.

SOURCE: Climatological Data, Annual Summaries, 1974, 1975, 1976, National Oceanic and Atmospheric Administration.

Background Wind Data

Long-term Weather Bureau wind data (Goodridge, J.D., et al., 1971, Winds in California, Water Resources Evaluation, California Resources Agency) for stations located at San Francisco Airport (about 13 miles south of YBC), locally at Potrero Hill (about 2 miles south of YBC), and at Alameda (approximately 8 miles southeast of YBC) indicate that dominant air flow in the San Francisco area is from the west (sector from northwest through southwest). Generally west winds flow from May through August. During rainy periods (November through March) winds generally flow from west, southwest and northwest directions. The predominant directions at San Francisco Airport generally are west-northwest and west, while the Potrero Hill winds shift to peak at southwest, and the Alameda station shows a predominant west direction with frequent winds from the northwest and southwest.

None of the Weather Bureau stations mentioned above can be considered to have wind patterns identical to those at YBC. Such information can be generated from an earlier study of regional wind patterns in the Bay Area (Bay Area Air Pollution Control District, 1970, A Study of Airflow Patterns in the San Francisco Bay Area, Information Bulletin 6-15-70), which reprints an earlier study (commonly referred to as the "Smalley Report") by the U.S. Weather Bureau and the California State Civil Defense Agency. In that study, surface winds throughout the Bay Area at 33 cooperating stations were measured at six-hour intervals during the period 1952-1955. From the measurements, typical regional airflow patterns were compiled.

Out of the analysis came 40 regional airflow patterns. The pattern was compiled into eight basic types, one for each of the major wind directions (compass points). In each of these basic types there were subtypes, called, for example, "West 1", or "South 3."

The patterns, or flow direction maps, show the general directions of the surface winds at various locations throughout the Bay Area. (At a given location, such as the YBC area, the wind direction can be different, by 90 degrees or more, from the nominal (for example, "west") subtype direction). On some of the patterns, the directions at the YBC area are clearly indicated; on others, interpolation (estimation) between wind directions is required.

To apply the wind information in the Smalley Report to YBC, it was necessary to examine each wind flow subtype and determine for that subtype the actual wind direction at YBC. Then, for each wind direction at YBC, each wind flow subtype producing that direction at the site was identified, and the frequencies of occurrence of the appropriate subtypes were evaluated. From these, the most-frequent wind directions at the site were determined (see Table G-3). Wind speed and direction information based on measurements in 1973 at the Federal Office Building (San Francisco Civic Center area) is presented in Table G-4.

The Smalley Report also shows that often air is stagnant or nearly so, with no defined pattern of circulation. Such patterns are labeled as "light-variable" and are shown in Table G-5. They are of interest because they are related to smog-forming conditions during the summer and early fall.

APPENDIX G, TABLE G-3

OCCURRENCE OF PARTICULAR WIND DIRECTIONS IN THE VICINITY OF YBC

Site Wind Direction (from compass point shown)	Annual Frequency (%)
N	1.4
NE	4.2
E	0.5
SE	4.3
S	3.5
SW	7.0
W	36.5
NW	17.9
Annual Frequency of Winds	75.3%

SOURCE: BAAPCD, Information Bulletin, June 15, 1970, A Study of Air Flow Patterns in the San Francisco Bay Area (Smalley Report).

APPENDIX G, TABLE G-4

WIND SPEED AND DIRECTION, SAN FRANCISCO FEDERAL OFFICE BUILDING*

MONTH	MEAN SPEED (M.P.H.)	PREVAILING DIRECTION (FROM)
January	6.7	N
February	7.5	W
March	8.5	W
April	9.5	W
May	10.4	W
June	10.9	W
July	11.2	W
August	10.5	W
September	9.1	W
October	7.6	W
November	6.3	W
December	6.5	N
Year Average	8.7	

*Observation program reduced; wind data not available after 1973.

SOURCE: U.S. Department of Commerce, 1973, National Oceanographic and Atmospheric Agency, Local Climatological Data, San Francisco, California, 1973.

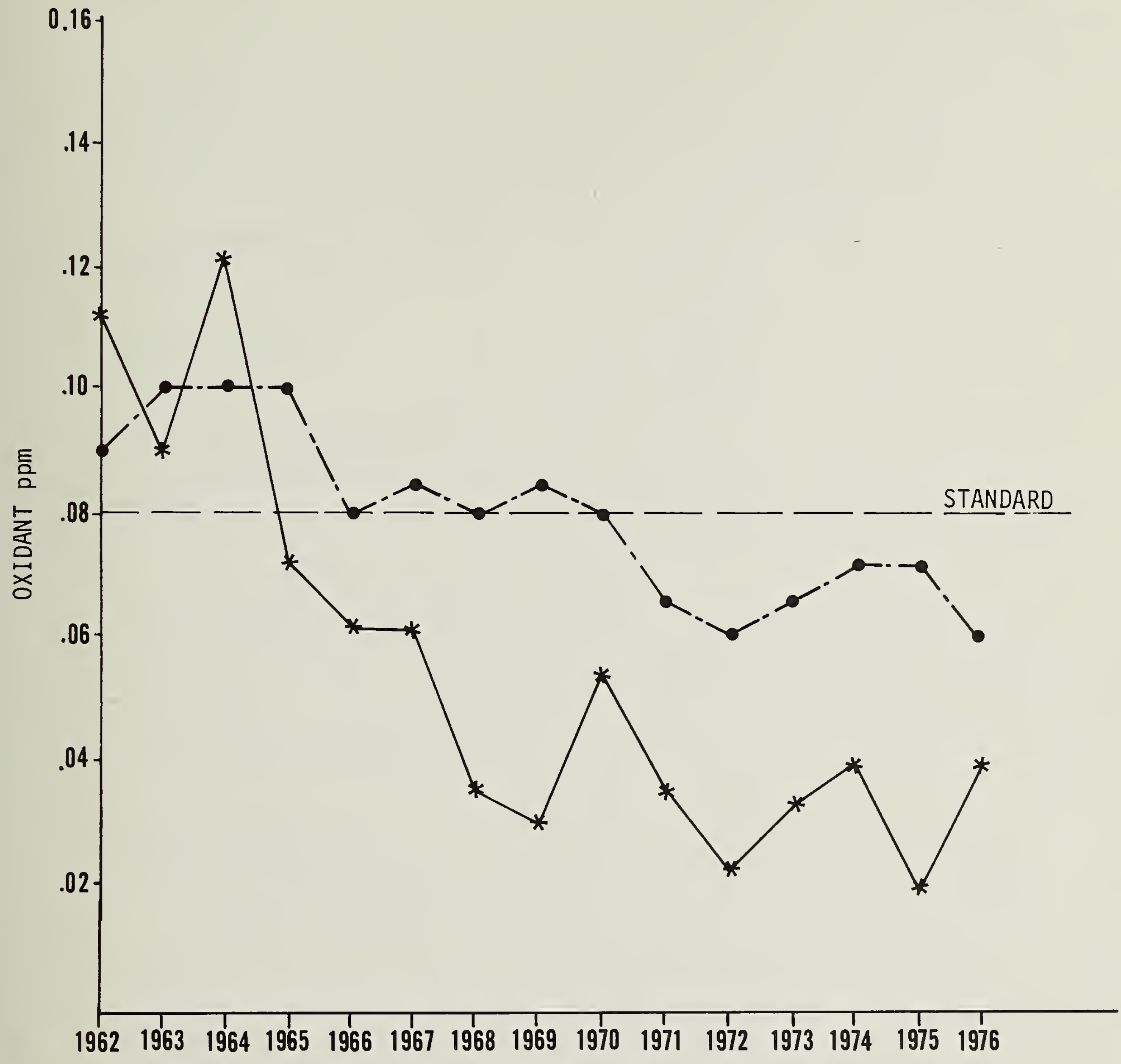
APPENDIX G, TABLE G-5

PREVALENCE OF STAGNANT OR "LIGHT-VARIABLE" CIRCULATION PATTERNS IN THE SAN FRANCISCO BAY AREA, 1952-1955 (PERCENTAGE OCCURRENCE)

	Time Period				All
Month	4 a.m.	10 a.m.	4 p.m.	10 p.m.	Periods
January	39%	32%	30%	35%	34%
February	41	29	20	43	33
March	31	30	4	26	23
April	33	19	1	13	16
May	31	14	2	14	15
June	17	7	0	6	7
July	12	5	0	4	5
August	9	15	0	4	7
September	38	38	2	22	22
October	52	39	5	34	32
November	58	44	23	51	44
December	35	27	22	31	29
Annual Average	33%	24%	9%	24%	22%*

*Light-Variable wind percentages were rounded; therefore, when added to the annual wind frequency (Table G-3), they do not total 100%.

SOURCE: BAAPCD, Information Bulletin, June 15, 1970, A Study of Air Flow Patterns in the San Francisco Bay Area (Smalley Report).



Source: Environmental Management Task Force, Air Quality Maintenance Plan, Technical Memo #3, (ABAG/MTC/BAAPCD) March 1977.

LEGEND

--- San Francisco

•——• District (BAAPCD) (all reporting stations in 9 county area)

Oxidant 1 hour standard: 0.08ppm (parts per million); Oxidant = Ozone, a measure of photochemical smog

TREND OF AVERAGE HIGH-HOUR OXIDANT CONCENTRATIONS 1962-1976	G-1

APPENDIX G, TABLE G-6

ANNUAL AVERAGE EMISSIONS, SAN FRANCISCO, 1975, (TONS PER DAY)

Emission Sources	Part	Org	NO_x	SO_2	CO
Chemical					
Nitric Acid	--	--	--	--	--
Sulfur	--	--	--	--	--
Sulfuric Acid	--	--	--	--	--
Other Chemical	0.6	0.5	--	--	--
Other Industrial/Commercial					
Pulp and Paper	--	--	--	--	--
Metallurgical	--	--	--	--	--
Mineral	3.6	--	--	--	--
Other Processes	4.6	1.6	--	--	--
Organic Compounds Evaporation					
Storage Tanks	--	2.4	--	--	--
Coating Operations	--	19	--	--	--
Degreasers	--	6	--	--	--
Dry Cleaners	--	2	--	--	--
Rubber, Plastic Product Mfg.	--	6.4	--	--	--
Other Organics Evaporation	--	4.7	--	--	--
Gasoline Marketing					
Bulk Loading Plants	--	--	--	--	--
Service Stations--Spillage	--	0.4	--	--	--
--Underground Tanks	--	0.7	--	--	--
--Filling Auto Tanks	--	3.8	--	--	--
Combustion of Fuels					
Domestic	0.7	--	3.4	--	0.2
Commercial & Institutional	0.3	--	1.4	--	0.1
Utilities--Power Plants	0.8	0.1	9.7	3.7	--
Other Industrial	0.1	0.1	1.5	0.3	0.3
Burning of Materials					
Incineration	0.2	0.4	0.1	--	1.1
Agricultural Open Burning	--	0.1	--	--	0.1
Accidental Fires	1.4	1.9	0.1	--	6.1
Off-Highway Mobile Sources					
Agricultural Tractors	--	--	--	--	--
Construction Equipment	0.4	1	5.4	0.7	14
Ships	0.3	0.6	2.2	8	0.3
Locomotives	0.1	0.2	0.7	0.1	0.3
Other Engines	0.1	4.6	0.3	--	19
TOTAL (District Jurisdiction*)	13	57	25	13	42

APPENDIX G, TABLE G-6 (continued)

ANNUAL AVERAGE EMISSIONS, SAN FRANCISCO, 1975 (TONS PER DAY)

Emission Sources	Part	Org	NO_x	SO_2	CO
Motor Vehicles					
Cars and Light Duty Trucks	3.9	34	27	1	260
Heavy Duty Trucks	0.6	12	7	0.8	65
Buses	--	0.2	0.7	0.1	0.9
Motorcycles	--	0.8	--	--	2.1
GRAND TOTAL	18	100	59	15	370

*District Jurisdiction: those sources and emissions which come under BAAPCD regulations.

SOURCE: BAAPCD, Emissions Inventory Summary Report, Base Year 1975, August 18, 1976.

APPENDIX G, TABLE G-7
MINOR STATIONARY SOURCES IN VICINITY OF YBC*

1. San Francisco Iron Foundry
260 Townsend Street
(between 3rd and 4th Sts.)
Comment: This is the largest point source in the vicinity of YBC. No emission test data available.

2. Pisani/Carlisle, Graphics
651 Brannan St.
(between 5th and 6th Sts.)
Comment: Although Pisani has violated District emission regulations in the past, new emission control equipment per District specifications has recently (7/30/77) been installed. Future emissions are anticipated to be insignificant by BAAPCD if emission control equipment functions properly.

3. Hills Brothers Coffee
2 Harrison St.
(at The Embarcadero)
Comment: Organics and hydrocarbon emissions have at times approached District standards. Source test conducted in 1973 confirms this. Caution should be exercised in applying tests made four years ago to present or future emissions. At present, BAAPCD estimates emission levels are within acceptable limits.

4. Superior Coffee
642 Harrison St.
(between 2nd and Hawthorne Sts.)
Comment: No source test data available.

5. Small Foundries and Printing Companies
Comment: Numerous small foundries and printing companies are located in the vicinity of YBC. No estimates of emissions are available. However, they are thought to be minor by BAAPCD.**

6. Intermittent Sources
Comment: The South Pacific Terminal and ships at San Francisco docking facilities are minor intermittent emission contributors. Table G-6, pages 103-104, shows emissions from ships that are in motion (not "at docking."). These emissions do not include the intermittent emissions from ships at dock as discussed above.

*List supplied by J. Moorad, Field Inspector, BAAPCD, telephone communication, August 1, 1977.
**J. Moorad, Field Inspector, BAAPCD, telephone communication, July 24, 1977

Background For Bay Area Air Pollutant Isopleth Maps

The Bay Area Air Pollutant Isopleth Maps (maps and descriptive material are on file at the San Francisco Department of City Planning) were prepared by URS Research Company for the U.S. Department of Housing and Urban Development (HUD), San Francisco Area Office, and the U.S. Army Corps of Engineers, San Francisco District, to aid HUD appraisers in determining current air quality. Pollutants analyzed and mapped for the Bay Area were carbon monoxide (CO), sulfur dioxide (SO_2), and suspended particulates (dust). Sulfur dioxide was not mapped for San Francisco itself, as the major point sources are located elsewhere, generally downwind. A diffusion model, termed Baymod, developed by BAAPCD was used in the preparation of the 1:125,000 scale maps. The input data used in the model were derived from an emission inventory compiled by BAAPCD for the year 1973. The emission inventory used was based on five categories of sources: mobile sources, major stationary sources, minor stationary sources distributed by population, airports, and agricultural burning.

Consideration was given by HUD/URS to updating the emission inventory to 1975 to better represent the present conditions; however, it was decided that short of recompiling the entire inventory a significant gain in accuracy would not be obtained.

The HUD/URS material states, "CO emissions dropped between 1973 and 1975 but less than 10 percent in most Bay Area counties. Changes in methods used to calculate CO emissions could more than offset the apparent decrease since 1973. Sulphur dioxide emissions also dropped between 1973 and 1975 due to better stationary source controls; however, large increases of SO_2 emissions are occurring at present due to switching from natural gas to fuel oils. Therefore the 1973 condition is probably more representative of the current situation than is 1975. Particulate emissions have not changed significantly since 1973."

The emission inventory used to generate the concentrations was averaged over a 2-km x 2-km area. The HUD/URS report points out ". . .the placement of lines is only an approximation and one must exercise care when drawing conclusions based on information presented on the maps. Also, CO concentrations in particular tend to be highly localized next to heavily traveled roadways and congested downtown areas. Since the model uses emissions data averaged over 2-km, it tends to under-estimate CO concentrations next to large sources of CO." Current isopleth levels in the YBC area are presented in Section V.G (main EIR text). The implications of large sources of CO, such as freeways and downtown streets, are discussed in Section VI.G.

2. CLIMATE AND AIR QUALITY IMPACTS

CONTENTS

Mobile Sources

APPENDIX G, TABLE G-8

MAJOR LINE SOURCES IN ONE KILOMETER SQUARE AREA

East/West Line Sources/1/ (See footnotes at end of this Appendix)

Market Street - Fifth to First*
Mission Street - Fifth to First*
Howard Street - Fifth to First*
Folsom Street - Fifth to First*
Harrison Street - Fifth to First*
Bryant Street - Fifth to First*
James Lick Freeway

North/South Line Sources

Fifth Street - Market to Bryant
Fourth Street - Market to Bryant
Third Street - Market to Bryant
Hawthorne Street - Howard to Harrison
New Montgomery Street - Market to Howard
Second Street - Market to Bryant
First Street - Market to Bryant*

*Although First Street is not within the one-kilometer square area, traffic volume estimates used in the air quality analysis include the pertinent segments of all east/west links from First Street to Fifth Street (that is, including the segment from the eastern boundary of the square to Second Street for each major east-west Street).

Emission Rate Corrections

Per-car emission rates used in the BAAPCD guidelines (as initially applied in this EIR), and in the Systems Applications, Inc. (SAI) report that served as input for CO box model and smog discussions, were based on Compilation of Air Pollutant Emission Factors, 2nd Ed., March 1975, EPA/OAP Publication AP-42, Research Triangle Park, North Carolina, as revised by the data of Supplement 5 (December 1975) thereto. Subsequent EPA studies have shown that catalytic converters, whose function was to oxidize (burn) unburned hydrocarbons and CO to form harmless carbon dioxide (CO_2), have been deteriorating faster than expected. Supplement 8 to AP-42 reports the expected increases in per-car emissions of CO and hydrocarbons. ARB/ABAG have converted these to correction factors for the entire California motor-vehicle "inventory" for 1985 and 2000 and have made similar corrections for recently mandated improvements in NO_x emission control. Because of late availability of this information, the changes were not incorporated in the initial calculated concentrations for this EIR (for example, in the Systems Application, Inc. (SAI) input report Analysis of the Impact on Ambient Oxidant and Carbon Monoxide of Emissions from the Proposed Yerba Buena Center, September, 1977). However, all numerical results in the text of this EIR, including revisions to the SAI results, reflect the Supplement 8 and the NO_x control changes.

Stationary Sources

APPENDIX G, TABLE G-9

STATIONARY SOURCE EMISSIONS

Stationary Source Emissions, Generalized Land Use Categories.

Residential:	Hotel Rooms Market Housing Elderly Housing Family Housing
Commercial:	Retail Commercial Commercial Entertainment
Office:	Office Community Service Downtown Support Service
Light Industry:	No Breakdown
Convention Center:	No Breakdown Needed
Recreation/Entertainment Park:	No fuel-combustion emissions--all electric. (Modeled after Tivoli Gardens).

Addition of Background Concentrations

It is recognized that a background concentration should be added to each computed concentration in the tables of Section VI.G. This is because additional pollutants would be entering the one-kilometer square from upwind sources. The analysis is complicated because at the same time some of the YBC-generated pollutants are leaving the square. According to the 1975 BAAPCD Guidelines, "Except in the case of suspended particulate, it is not unreasonable to assume that the bulk of the local background for primary contaminants, especially carbon monoxide, is due to emissions in the immediate vicinity of the source. In the case of particulate, a conservative estimate of 35 micrograms per cubic meter may be made for background from sources outside the local one-kilometer square."

A complete analysis incorporating background contributions would require the addition of a contribution from each upwind square (the more-distant squares adding less and less). For discussion purposes, upwind squares are given the same orientation as the YBC Square. The BAAPCD monitoring station at 939 Ellis St., the location for the San Francisco base-year projections, is in the one-kilometer square whose southeast corner is the northwest corner of the YBC square; that is, the two squares are diagonally offset, sharing a corner but not an edge. Thus, the contribution from the BAAPCD square to the YBC square would be less than that from the adjacent squares (edge sharers) and would, even if the two squares shared an edge, probably be less than 20% of the BAAPCD square's measured concentration. Therefore, base-year San Francisco concentrations were not added to YBC-square mobile and stationary concentrations, since this procedure would in effect be "double counting," yielding inflated concentrations. Justification for these statements is as follows: Standards would be exceeded in most cases (pollutants, averaging times, years, alternatives) if base-year (BAAPCD-station) concentrations were added to YBC-generated concentrations. Such extensive violations are not occurring now and would not be exected in future years.

One rule of thumb for a (citywide) background level to be added to a locally generated concentration exists;/2/ background (for CO, as an example) within an area along North Van Ness Ave. (in the vicinity of the BAAPCD monitoring station) was taken to be about 27% of the locally generated concentration. It seems reasonable to apply such a factor for YBC, as both locations have urban areas upwind of them.

- Base Year Concentration Projections

- Current and projected base year concentrations for San Francisco at the 939 Ellis St. BAAPCD monitoring station were computed with a "roll-forward" calculation technique for those pollutants and averaging times which appeared in the 1976 monthly BAAPCD Contaminant and Weather Summaries. The roll-forward technique was applied to: CO 1-hour and 8-hour; SO_2 24-hour; NO_2 1-hour; and Suspended Particulates 24-hour and 1-year.

- Where no measurements were available from the cited source, namely SO_2 1-hour and 1-year and NO_2 1-year, the Larsen technique, as shown

in the 1975 B.A.A.P.C.D. Guidelines for Air Quality Impact Analysis Area Computation Sheet #3, was used in the DEIR to convert to these times from other averaging times.

- The "roll-forward" technique was composed of the following elements:

  1) Projected emissions from all sources (tons/day) for 1977, 1980, 1988, District totals, as supplied by Nat Flynn, BAAPCD, were used as the starting point.

  2) To obtain San Francisco tons/day, we assumed a constant S.F.-to-District ratio for any one pollutant (tons/day) for future years (since San Francisco tons/day projections were not available).

  3) Within the District's mobile source emissions projections (tons/day), adjustments for EPA Supplement No. 8 and NO_x emission changes (1980 and 1988) were made.

  4) Future base-year concentrations were computed as:

$$\frac{\text{(1976 S.F. concentrations) X (Future year S.F. tons/day)}}{\text{(1976 S.F. tons/day).}}$$

Local Variability of CO Concentrations

Estimates of local variability of CO concentrations near urban streets have been presented by Ludwig and Kealoha./3/ Figure G-2, reprinted by them from Georgii, et al./4/, shows that surface CO concentrations in an urban canyon may typically differ by 100% from one side of the street to the other. Figure G-3, reprinted by them from Johnson,/5/ shows greater side-to-side differences from dye tracer experiments. Note that both of these figures are based on measurements elsewhere than YBC.

[Text continues on page 111.]

YBC streetside CO variations may be expected to be similar to the conditions described above, when final construction of buildings (any alternative) would be completed in 1988. In SAI's judgment, it is meaningless to predict absolute values of CO concentrations in an urban-canyon situation.

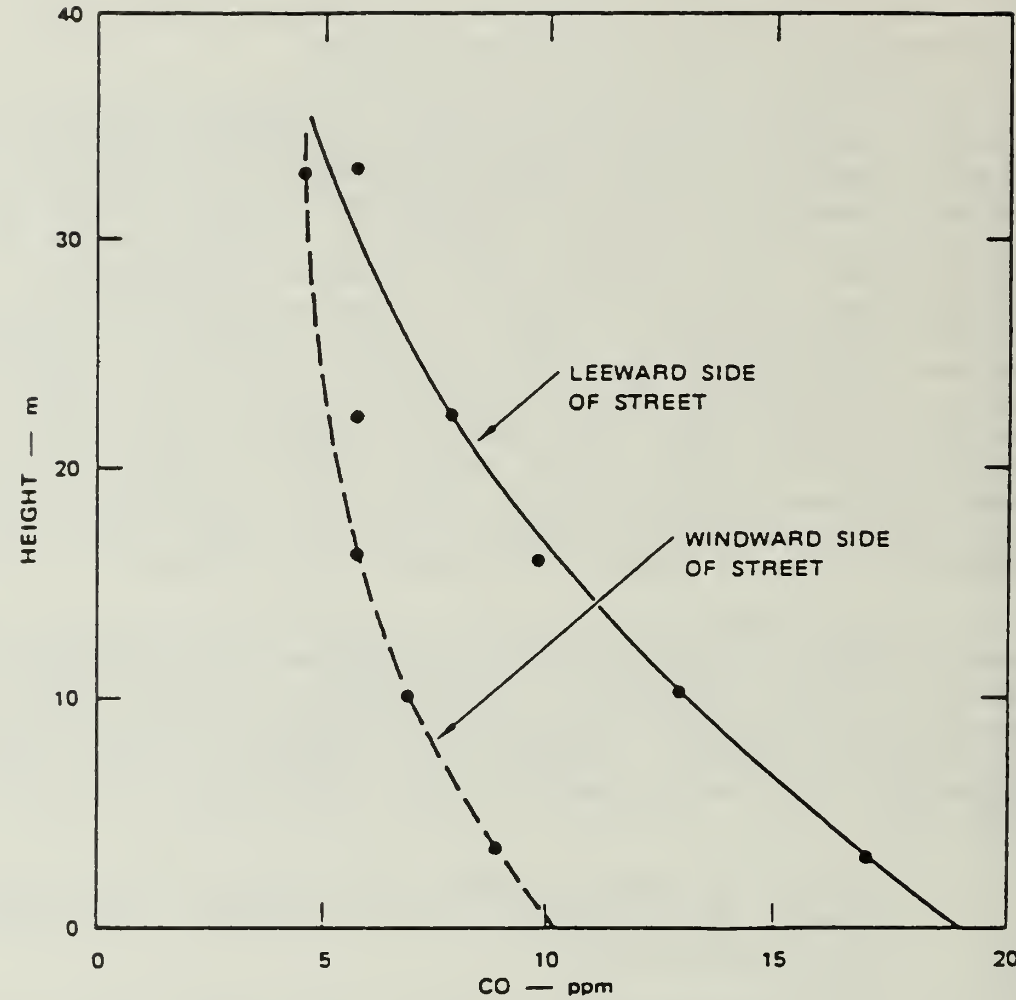
Photochemical Oxidant Formation Analysis

The following descriptive material is abstracted from the SAI report/6/ prepared for this EIR, with minor editorial changes. The National Ambient Air Quality Standard (NAAQS) for oxidant is a regional standard; namely, the oxidant concentration shall not exceed 0.08 parts per million (ppm) for one hour anywhere in a control region more than once per year. The standard is not designed for application to point sources because atmospheric oxidants (primarily, and hereinafter, "ozone") are not emitted directly: ozone is formed primarily by atmospheric reactions involving sunlight, hydrocarbons (HC), and nitrogen oxides (NO_x). The emissions that are the most significant precursors of ozone are HC and nitric oxide (NO) (emissions contain on the order of 10% of nitrogen dioxide (NO_2)). Motor vehicle exhaust is the most important source of these precursors in the Bay Area, accounting for roughly three-fifths of all NO and one-half of all HC. Motor vehicle exhaust is currently the largest source of emissions at the YBC site.

The basic elements of the current understanding of photochemical ozone formation are discussed in the following. The chemistry of the nitrogen oxides is important in understanding the relationship between calculated concentrations of NO_x and standards for NO_2, as well as the smog-formation process. Similarly, the chemistry of HC and NO_x demonstrates why smog formation is not proportional to either HC or NO production.

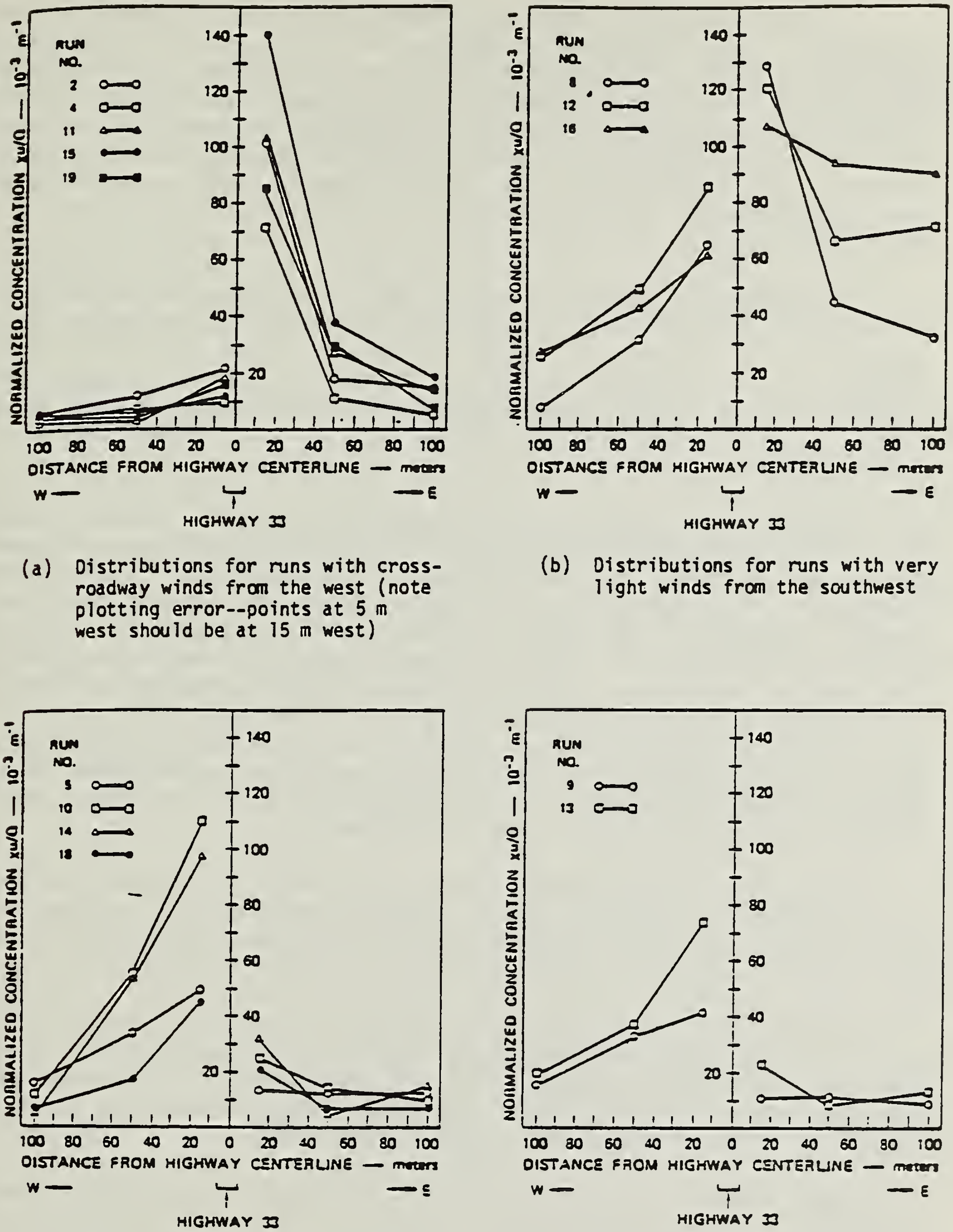
- o Various mechanisms oxidize NO to NO_2. A major mechanism involves the breakdown of HC in sunlight to form compounds that react with NO.
- o NO_2 is photolyzed by sunlight to form ozone (O_3) and NO. In a reverse reaction, NO can react with O_3 to form NO_2 and O_2. Thus, the higher the ratio of NO_2 to NO, the greater the net ozone production.
- o By converting NO to NO_2 without using up ozone, HC greatly increases the net production of ozone.

These reactions are such that peak ozone concentrations usually occur several hours after the HC and NO_x are emitted. By that time, the pollutants may have been carried tens of miles by the wind and mixed by atmospheric turbulence with gases from many other sources.



Source: Georgii et al. (1967).

FIGURE G-2 THE VERTICAL DISTRIBUTION OF CO CONCENTRATION IN A STREET CANYON WITH TRAFFIC VOLUME OF 1500 VEHICLES PER HOUR



(a) Distributions for runs with cross-roadway winds from the west (note plotting error--points at 5 m west should be at 15 m west)

(b) Distributions for runs with very light winds from the southwest

(c) Distributions for runs with winds from the southeast sector

(d) Distributions for runs with very light winds from the east

Source: Johnson (1974).

FIGURE G-3 MEASURED TRACER CONCENTRATION DISTRIBUTIONS

In ozone formation the proportions of HC and NO are important. HC in excess of that required to oxidize the NO present contributes little to producing ozone. Similarly, NO beyond the amount that can be oxidized by the available HC will disperse to low concentrations before it is oxidized to NO_2 and can produce ozone. A sufficient excess of either precursor can lead to reduced ozone concentrations. Precursor materials that do not result in ozone formation while the air mass is still in the urban region may contribute to elevated background concentrations at later times in downwind locations.

Production of ozone at levels that cause concern depends on the presence of HC and NO_x precursors at high concentrations in bright sunlight for a few hours. Since turbulent eddies are generated in the atmosphere by surfaces heated by sunlight, intense sunlight tends to promote mixing, dilution, and dispersion of pollutants. Thus, during the course of a day the conditions that favor ozone production may be self-limiting.

Denver, Colorado Land Use Sensitivity Analysis. The conclusions of the SAI Denver study (sensitivity to uncertainties in urban growth), as they apply to YBC, are summarized in the EIR text. The basis for those conclusions is presented here. SAI recently completed a study of the air quality impacts of the urban development anticipated in the Denver metropolitan region./7/ Denver's smog (ozone) levels were predicted on the basis of forecasts of urban growth patterns supplied by local agencies. The results had uncertainties because of uncertainties in input data as well as model inadequacy. These uncertainties were determined separately by tests of the sensitivity of results to variations in emissions input and comparison of the results with observational data. It is the sensitivity testing that applies to the YBC predictions.

The Denver metropolitan region consists of a central city and a ring of suburbs. The region has a population of about 1.3 million, which is projected to reach 2.35 million by the year 2000. As might be expected, most of the population growth is anticipated in the suburban ring.

To test the sensitivity of ozone forecasts to variations in growth patterns, SAI performed model simulations of ozone formation in the year 2000 from predicted emissions (the "base case") and also from several alternative emission patterns. All winds, turbulence, and other physical conditions were unchanged in these simulations.

Each alternative simulated a redistribution of population in which the emissions in a given subregion (30-75 sq. mi.) were reduced by 25% and emissions in all other subregions increased proportionally so as to maintain the same total emissions in the region. A final alternative was a reduction in the emissions in the City of Denver with a similar redistribution. In this case the emissions were reduced 17.5%, which made them equivalent to 1976 emissions in Denver. Thus eight model simulations were carried out:

1. Base case: year 2000 emissions (28 July 1976 meteorology used in calculating ozone concentrations).

2-7 Emissions in Subregions 1-6 reduced 25% each (one at a time, with no other changes in each simulation).

3. Emissions in Denver reduced 17.5%.

Perturbations (emission reductions) in each subregion were simulated separately to determine whether the position of the perturbation relative to the wind trajectory through downtown Denver affected peak ozone concentrations. That is, did it matter if the upwind, downwind, or off-path emissions were changed?

The simulations were carried out with SAI's Denver Model, a photo-chemical model that computes the concentrations of various pollutants, including ozone, in two-mile by two-mile grid squares at each hour of the day, given hourly values of emissions and meteorological variables.

The meteorology chosen for the sensitivity study was that of 28 July 1976. For that date and 1976 emissions, the Denver Model predicted a region-wide maximum one-hour-average ozone concentration of 20 parts per hundred million (pphm) between 3 and 4 p.m. For the emissions inventory for the year 2000 and the same meteorology (Case 1), the Denver Model predicted a maximum one-hour-average of 10 pphm between 2 and 3 p.m. For the other seven sensitivity runs listed above, no difference was found in either the location, time, or magnitude of this maximum. In fact, the differences among the eight runs in terms of predicted ozone concentrations were confined at all times of the day to at most a difference of 1 pphm in one or two grid squares.

Concentration differences should depend on the location of the emissions reduction area with respect to the region-wide emissions patterns for any given mean wind direction. The maximum changes in the sensitivity study of the Denver Model were too small, however, to identify any such effect. In other words, all seven perturbations of the base case emissions inventory resulted in essentially identical predictions for ozone concentrations in the Denver region. This result is ascribed to the time factor in ozone production: by the time that significant amounts of ozone have been formed, the emissions are too well mixed to reflect their origins. Furthermore, the region-wide emissions were not changed in this exercise and in spite of the rather drastic imposition of growth controls that emissions reductions of up to 25% would imply, no more than 7% of the total regional emissions were redistributed. Thus, it is apparent that these changes in the spatial distribution of emissions have no effect on ozone concentrations. From this one may infer that land use controls that would reduce the population of any subregion by as much as 25% without changing the regional population would be ineffective in terms of reducing ozone concentrations.

Each of the alternative cases in the Denver study represents changes in emissions equivalent to the displacement of 50,000 to 100,000 people from an area of 30 to 75 sq.mi. The displacement of this population represents a much more massive perturbation in emissions and land use than any of the various plans for developing YBC or even a go/no-go decision for YBC. No statistically significant effect would be produced in ozone air quality in Denver by such perturbations; it seems clear that the much smaller perturbation in YBC could not produce a calculable or measurable change in ozone concentrations in the Bay Area.

This is not to say (ESA judgment) that full buildout of YBC would not increase smog levels in the Bay Area; commute trips might add emissions that are not now occurring. The Denver study does prove that it is impossible to calculate the smog-forming impacts of YBC, with respect to "where" and "how much."

Comparison of YBC Emissions with Those of the Remainder of the Bay Area (second SAI sensitivity technique referred to in EIR text). YBC occupies approximately one-third of the 1-km square (0.4 sq.mi.--250 acre) analysis area. Peak Bay Area ozone concentrations typically occur in mid to late afternoon, six to eight hours after the peak emissions during the morning rush hour. Peak ozone concentrations on days with westerly winds occur to the east of the Oakland hills in the Livermore Valley, which is about 60 to 70 km (about 35 to 40 miles) downwind. On days with northerly winds blowing down the bay shoreline, ozone concentrations occur at comparable distances in the direction of San Jose or beyond. A typical spreading angle for a pollutant plume (the 3-dimensional "envelope" within which the emissions (and their reaction products) from one source exist as they are transported and dispersed by the winds), given San Francisco wind speeds and sunny conditions, would be on the order of 15 degrees./8/ At a distance of 60 km (about 35 miles) the plume width would be about 15 km (about 10 miles). Thus emissions within a 15 km (10 mile) circle around YBC would be partially or fully mixed with the YBC emissions by the time and at the place of the peak ozone concentrations. Assuming that the emissions in the 15 km (10 mile) circle are roughly homogeneous, the ratio of YBC emissions to total mixed emissions at the peak-concentration locations (Livermore or San Jose areas) would be less than about 0.2%. Thus, YBC emissions could be expected to have a statistically insignificant effect on ozone concentration peaks or patterns downwind of the site.

LIRAQ Verification (Third SAI sensitivity technique referred to in EIR text). This analysis is summarized fully in the EIR text.

SAI Photochemical Modeling Exercise for YBC. (Fourth (major) sensitivity technique referred to in EIR text). A trajectory model was used in this computer simulation, carried out as part of this EIR effort. The model performs the same photochemical reaction analysis as a grid model but examines only those grid locations along the trajectory (wind "path") of the reactive pollutant plume passing through the YBC site. For the sensitivity analysis, YBC site mobile-source emissions at full development for Alternative A (highest emissions) were used, as were the Base Year 1988 emissions. The inputs for the SAI analysis included traffic data provided by TJKM for the YBC area (1-km square).

Analysis of ozone formation was conducted for two trajectories passing through downtown San Francisco in the vicinity of the YBC site, one traversing the Bay and proceeding eastward over Oakland and into Livermore, the other moving southeastward over portions of the Bay and into San Jose. It was therefore necessary to estimate emissions along trajectories from YBC down the shore of San Francisco Bay to San Jose and from YBC across the Oakland hills to Livermore.

Traffic volumes and speeds for the years 1977,1980 and 1988 were those used in the body of the EIR. These traffic data were used to estimate the hourly vehicle miles traveled (VMT) within the 1-km square for the morning peak traffic period (6 - 9 a.m.). Because automobile emissions depend on vehicle speed, separate VMT estimates were made for each average speed of vehicle operation.

Emission factors for an "average" California vehicle at various operating speeds were estimated using a modified program, written to estimate emission factors in accordance with EPA recommendations/9/, and subject to the assumptions regarding federal motor vehicle regulations outlined in that reference. Delays of a number of years in meeting the original deadlines assumed in that reference (and non-correction for Supplement 8 changes) would cause an error within the limits of accuracy of this sensitivity analysis. That is, the conclusions of the sensitivity analysis are unaffected by such input errors.

The distribution by class of vehicles operating in San Francisco was assumed to be 76% light duty gasoline vehicles, 21.7% light duty gasoline trucks, 1.6% heavy duty gasoline vehicles, and 0.7% heavy duty diesel vehicles. The distribution of light duty vehicles by model year was derived from data provided by BAAPCD./10/ The annual distance traveled for each model year was assumed to be the same as the national average./9/ All vehicle age distributions and annual vehicle mileage distributions for heavy duty vehicles were assumed to be the same as the national average./9/ NO_x emissions were assumed to be 95% NO and 5% NO_2.

The data on average emissions were combined with the data on average speeds on various streets and the data on morning peak hourly VMT to obtain the hourly emissions of pollutants in the morning rush hour.

For the trajectory model analysis, emissions of NO_x and hydrocarbons from ground sources on the trajectories of interest were calculated from contour plots of the rates of emission of these pollutants./11/ The meteorology assumed for the analysis is presented in the SAI report./6/

Because the photochemical modeling study was intended to examine the sensitivity of Bay Area ozone patterns to YBC emissions, rather than to predict absolute concentrations, the use of SAI's full scale grid model was not deemed appropriate. The trajectory model used includes the same photo-chemical reaction computation package as the grid model but does not carry out the computations for all grid locations. Only grid locations along the trajectory (wind "path") passing through the YBC site are considered.

The model was applied to two trajectories: one on a straight-line path from YBC to Livermore, the other on a straight-line path to San Jose. A portion of the YBC-San Jose trajectory is over the Bay, where emissions are very low. Thus a larger fraction of the pollution arriving at San Jose via this trajectory would come from YBC than would be the case for a trajectory that followed the Bay shore. Three computer runs were made for each trajectory. The first run was made with the Alternative A

1988 emissions from YBC and with emissions at every other grid point on the trajectory set to the corresponding regional emissions in 1977, corrected for continuing implementation of automobile emission controls. (Regional geographical emissions forecasts for 1980 and 1988 were not available.) In the second run, the emissions at the grid point corresponding to the YBC site were reduced by an amount equal to the maximum difference in emissions between any of the alternatives in 1988 and Base Year 1988 (in fact, by the 1988 Alternative A increments). The objective of the second run was to determine whether a calculable change in oxidant/ozone concentrations at Livermore or San Jose would result from the maximum change in pollutant emissions at the YBC site that could occur because of development according to one of the alternatives. A third run was then made in which emissions at the grid point corresponding to the YBC site were reduced by twice the reduction of the second run. The objective of the third run was to assess the impact on the results of any errors in emissions estimates.

The results of the first run for each trajectory are presented in Figures G-4 through G-7 (computer printouts). Figure G-4 presents the predicted concentration of NO_2, plotted versus the time from the start of the simulation, for the San Francisco to Livermore trajectory. The concentrations are those at the points on the trajectory that the YBC-originating parcel would reach at the indicated times. Since all simulations were begun at 0500, the time corresponding to any point on the curve may be obtained by adding 0500 hours to the time from the start of the simulation. Thus Figure G-4 indicates that the simulation ended at approximately 1900 hours and the concentration of NO_2 (at Livermore) was then roughly 0.065 ppm. Figure G-5, page 121, presents the corresponding curve for Livermore-trajectory ozone (O_3) concentrations, and Figures G-6 and G-7, pages 123 and 125, are the curves for the San Francisco to San Jose trajectory. These figures indicate that the model predicts an ozone concentration of about 0.125 ppm in the vicinity of Livermore and about 0.095 ppm in the vicinity of San Jose for the conditions under which the simulation was carried out. The corresponding concentrations of NO_2 are about 0.065 ppm at Livermore and 0.075 ppm at San Jose. The NO_2 concentration in the trajectory passing over San Jose has a distinct rise as the air parcel approaches the city, corresponding to increased NO_x emissions there (see Figure G-6, page 123). The reaction of the emitted NO_x with ozone results in a somewhat depleted ozone concentration in the vicinity of San Jose, which is shown in Figure G-7, page 125).

For purposes of comparison, the concentrations predicted at Livermore and San Jose are shown in Table G-10, page 127. The table shows that a "YBC-size" reduction in the emissions reduces ozone and nitrogen dioxide concentrations by no more than one part per billion (ppb). One ppb is below the expected accuracy limits of the computation. The data indicate that downwind ozone and nitrogen dioxide concentrations would not be sensitive to the changes in the emissions at the YBC site which may be brought about by the four alternatives.

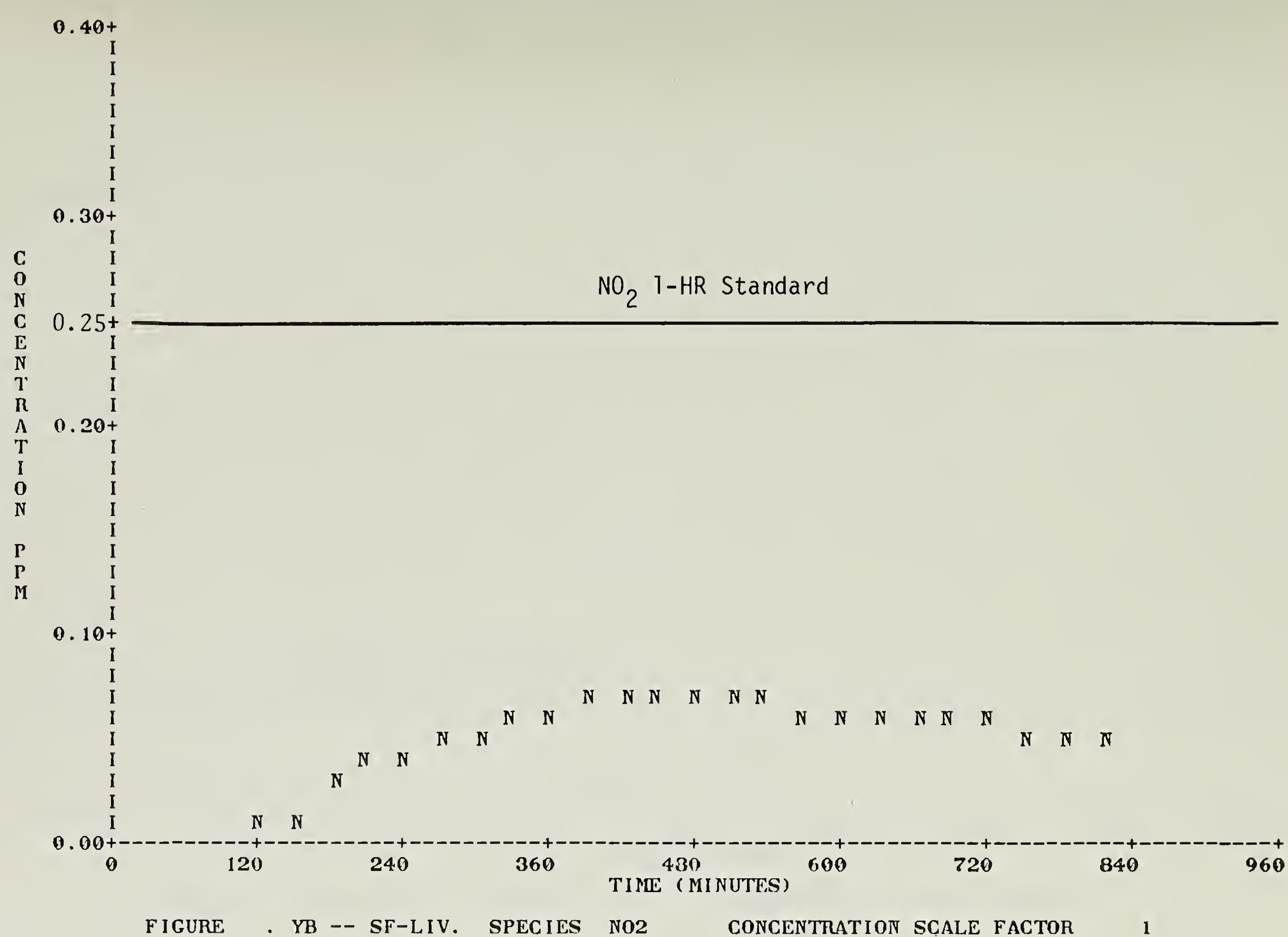


FIGURE G-4. NO_2 CONCENTRATIONS PREDICTED BY THE TRAJECTORY MODEL FOR THE TRAJECTORY FROM YBC TO LIVERMORE

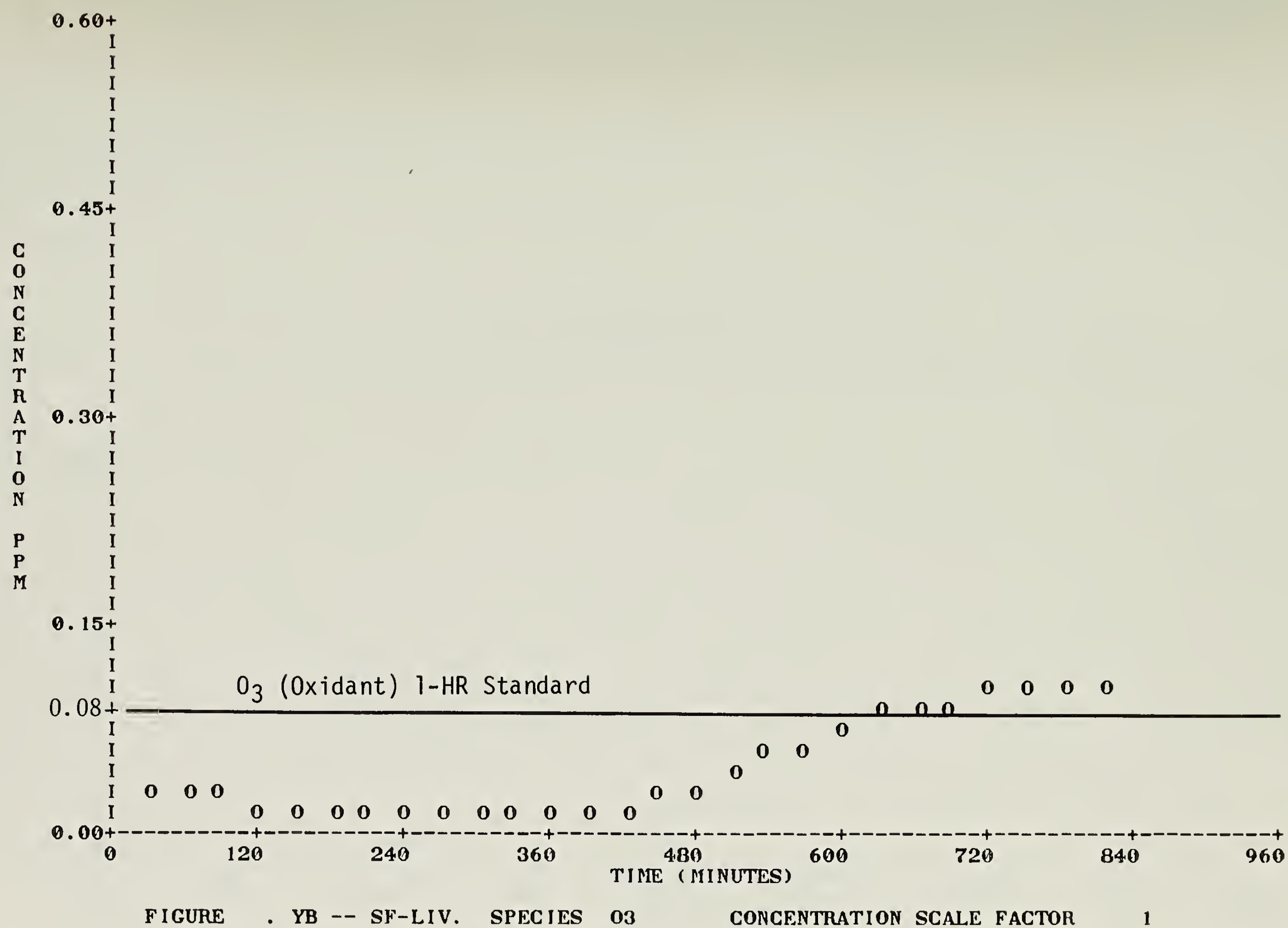


FIGURE G-5. O_3 CONCENTRATIONS PREDICTED BY THE TRAJECTORY MODEL FOR THE TRAJECTORY FROM YBC TO LIVERMORE

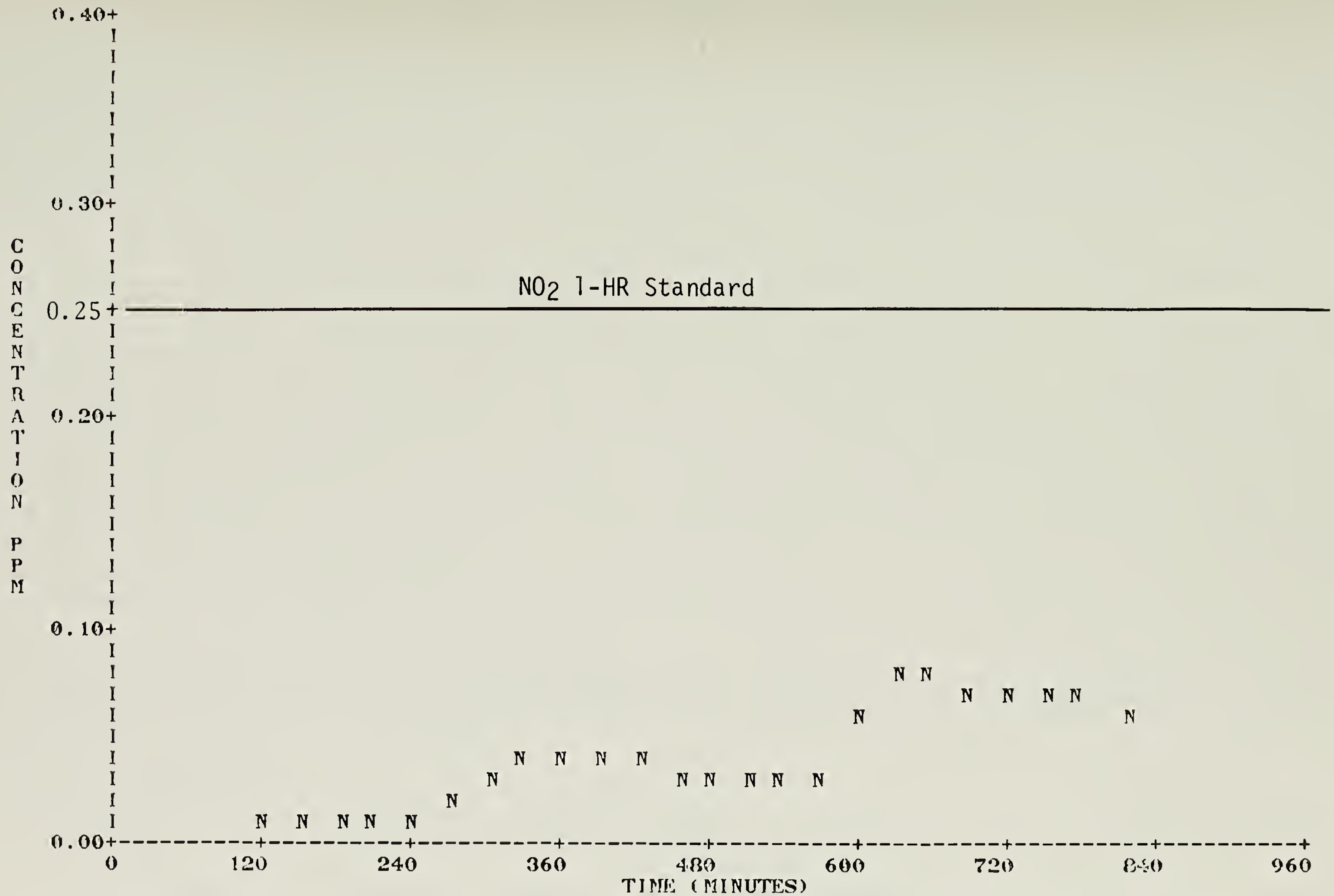


FIGURE . YB -- SF-SJ. SPECIES NO2 CONCENTRATION SCALE FACTOR 1

FIGURE G-6 NO_2 CONCENTRATIONS PREDICTED BY THE TRAJECTORY MODEL FOR THE TRAJECTORY FROM YBC TO SAN JOSE

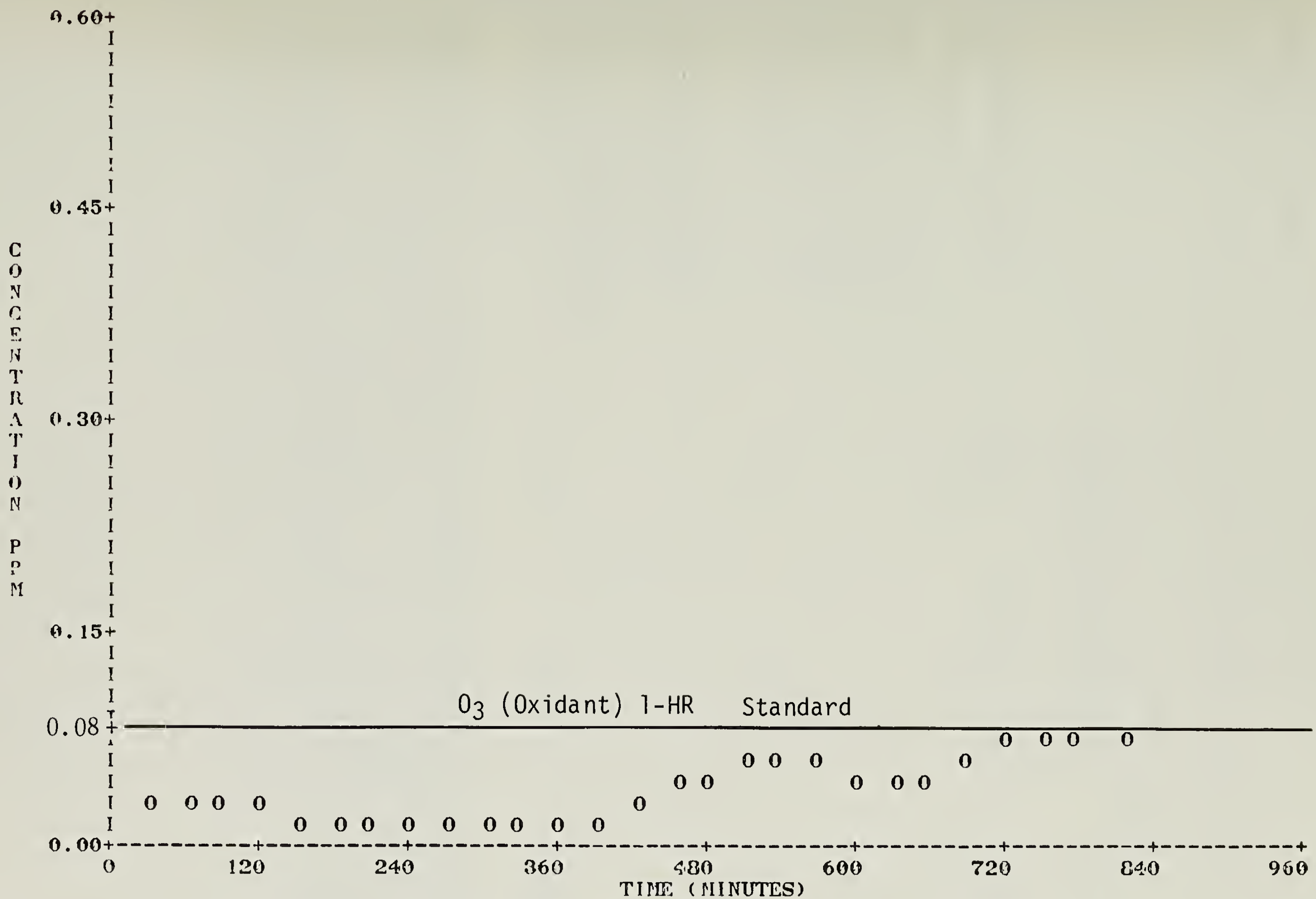


FIGURE . YB -- SF-SJ. SPECIES 03 CONCENTRATION SCALE FACTOR 1

FIGURE G-7 O_3 CONCENTRATIONS PREDICTED BY THE TRAJECTORY MODEL FOR THE TRAJECTORY FROM YBC TO SAN JOSE

APPENDIX G, TABLE G-10

TRAJECTORY MODEL PREDICTIONS OF OZONE AND NITROGEN DIOXIDE CONCENTRATIONS

	Concentration (ppm)			
	Livermore (San Francisco to Livermore Trajectory)		San Jose (San Francisco to San Jose Trajectory)	
Simulated Emissions	Ozone	Nitrogen Dioxide	Ozone	Nitrogen Dioxide
1988 Base Year	0.124	0.063	0.094	0.078
Emissions at YBC grid reduced by difference between YBC emissions under Alt. A in 1988 and "Base Year" 1988 emissions	0.123	0.062	0.094	0.078
Emissions at YBC grid reduced by twice the above difference (for further sensitivity check, including check of effect of errors in emissions)	0.123	0.063*	0.093	0.077

*The rise here is a result of the complicated chemistry of oxidant formation. Sometimes an increase in source emissions of one or the other primary ingredient (hydrocarbons or nitrogen oxides) can lead to a reduction in oxidant (ozone) or NO_2 level at a particular downwind point. These concentrations are based on the "Supplement 5" data. Changing the input emission values to "Supplement 8" and revised ARB NO_x values would change the table entries, but would have no effect on the conclusion about statistical insignificance of differences among these cases (SAI judgment).

Vertical Variations in Pollutant Concentrations

● If an attempt is made to provide clean ventilation air to a building, (as opposed to a recirculating ventilation system), the obvious source of the freshest air is the roof of the building. A 1972 General Electric study/12/ cited in the SAI report showed pollutant concentrations decreasing with height above street level both inside and outside buildings. This would be expected with ground level sources emitting material that disperses into cleaner upper air. It is most unlikely that under any atmospheric conditions rooftop air would contain higher concentrations of CO than street-level air. The advantage of rooftop air intakes increases with the height of the building.

Air Pollution: Effects on Environment, Human Health and Vegetation

A variety of health effects associated with air pollutants is possible. The most frequently observed effect involves irritation of the respiratory system. Long-term exposure to respiratory irritants can increase the chances of chronic respiratory diseases such as chronic bronchitis, pulmonary emphysema and lung cancer. Pollutants usually identified as contributors to respiratory problems include ozone, NO_2, SO_x and particulates.

Eye irritation is a second widespread effect of air pollution: ozone, NO_2, peroxyacetylnitrate (PAN/5/) and other oxidants are primarily responsible.

When absorbed into the bloodstream, CO, ozone and NO_x can reduce the oxygen-carrying ability of hemoglobin; CO is usually responsible for effects in this regard. When released in unvented spaces, it can be fatal.

Respiratory allergies such as asthma can be triggered by such contaminants as SO_2 or ozone. Asthma-producing aerosol pollutants may be either non-living aerosols (primarily dusts and organic particulates) or viable biological aerosols (pollen, molds, spores, etc.) all of which can be dispersed by excavation during construction or by demolition.

Studies to date analyzing air pollution and health effects apply to relatively healthy, young to middle-aged adults performing light exercise. Other groups--such as children, older adults, pulmonary disease patients, or workers performing heavy exercise--may be at risk at lower pollutant levels.

APPENDIX G, TABLE G-11
ENVIRONMENTAL AND HEALTH EFFECTS AND THRESHOLDS OF VARIOUS POLLUTANTS

CARBON MONOXIDE		
15-50 ppm	-	some headaches, plus loss of judgment and vision
100 ppm	-	increased incidence of headaches
300+ ppm	-	collapse and death
NITROGEN DIOXIDE		
0.5 ppm	-	depression in plant growth (varies with type of vegetation)
5 ppm (10 min)	-	Substantial but transient increase in airway resistance
2-10 ppm (1-hr)	-	acute injury to vegetation
0.6 -1.1 ppm	-	Increased respiratory disease
25 ppm (5 min)	-	Pulmonary discomfort
90 ppm (30 min)	-	Pulmonary edema
SULFUR DIOXIDE		
0.11-0.20 ppm (few hours)	-	Accentuation of symptoms in persons with chronic respiratory disease, especially elderly people
0.30 ppm (8 hours)	-	Plant injury threshold; trees and shrubs show permanent injury
1.6 ppm (few minutes)	-	Bronchial constriction
PARTICULATES		
100 ug/m^3	-	sunlight reduction
150 ug/m^3	-	visibility reduction
200 ug/m^3	-	(with more than 250 ug/m^3 of sulfur dioxide)--increased illness
300 ug/m^3	-	(with more than 630 ug/m^3 of sulfur dioxide)--chronic bronchitis
750 ug/m^3	-	(with more than 715 ug/m^3 of sulfur dioxide)--increase in death rate.
OXIDANT (OZONE)		
0.03 ppm (4 hours)	-	bronzing, silvering, glazing on lower leaf surfaces, growth suppression
0.05 ppm	-	Irritation of nasal passage
0.10 ppm (instantaneous)	-	Dryness in throat, eye irritation, breathing difficulties, emphysema
0.10 (30 min)	-	Headaches

SOURCE: Stanford Research Institute, 1974, Present and Prospective San Francisco Bay Area Air Quality.

FOOTNOTES

/1/ Continuing the convention that Market St. runs east/west rather than its true northeast/southwest.

/2/ San Francisco Planning and Urban Renewal Association (SPUR), 1975, Impact of Intensive High Rise Development on San Francisco, Summary and Detailed Findings.

/3/ Ludwig, F. L., and J.H.S. Kealoha, 1975, Selecting Sites for Carbon Monoxide Monitoring, SRI Project 3515, Stanford Research Institute, Menlo Park, California.

/4/ Georgii, H.W., E. Busch, and E. Weber, 1967, Investigation of the Temporal and Spatial Distribution of the Emmission (sic) Concentration of Carbon Monoxide in Frankfort/Main, Report No. 11, Institute for Meteorology and Geophysics of the University of Frankfort/Main, Germany.

/5/ Johnson, W. B., 1974, Field Study of Near-Roadway Diffusion Using a Fluorescent Dye Tracer, Symposium on Atmospheric Diffusion and Air Pollution, American Meteorological Society, 9-13 September 1974, Santa Barbara, California.

/6/ Systems Applications, Inc., Analysis of the Impact on Ambient Oxidant and Carbon Monoxide of Emissions from the Proposed Yerba Buena Center, September, 1977 -- a copy is on file with the office of Environmental Review (Department of City Planning).

/7/ Anderson, G.E., et al., 1977, Air Quality in the Denver Metropolitan Region, 1974-2000, EPA-908/1-77-002, Environmental Protection Agency Region VIII, Denver, Colorado.

/8/ Cramer, H.E., H.V. Geary, and J.F. Bowers, 1975, Diffusion-Model Calculations of Long-Term and Short-Term Ground-Level SO_2 Concentrations in Allegheny County, Pennsylvania, EPA-903/9-75-018, Environmental Protection Agency Region III, Philadelphia, Pennsylvania.

/9/ Environmental Protection Agency (EPA), 1975, Supplement No.5 for Compilation of Air Pollutant Emission Factors, Research Triangle Park, North Carolina.

/10/ Kim, M. Traffic Engineer, Bay Area Air Pollution Control District; telephone communication, August 9, 1977.

/11/ Lawrence Livermore Laboratory (LLL), 1974, Development of an Air Pollution Model for the San Francisco Bay Area, 2nd Semiannual Report to the National Science Foundation by LLL, University of California, Livermore, California.

/12/ General Electric Company, 1972, Indoor/Outdoor Carbon Monoxide Pollution Study, final report to the Environmental Protection Agency under Contract CPA-70-77, Philadelphia, Pennsylvania.

APPENDIX H: NOISE MEASUREMENTS AND IMPACT CRITERIA

1. AMBIENT NOISE MEASUREMENT SURVEY (SETTING)

Introduction

From 8 June to 8 August 1977, measurements were made by the staff of Charles M. Salter, P.E., in the Redevelopment Area to provide data on the existing noise environment. Field measurement locations were selected to provide a representative sampling of the area with particular emphasis on existing and prospective housing sites. The 25 measurement locations are shown in Figure 18 (Section V.H, main text, page 173). These site locations are listed in Table H-1.

Throughout the measurement period, the weather was typical for San Francisco during the summer months: the wind varied from calm to 15 mph; the temperature was between 50° and 70°F, and the sky conditions ranged from clear to overcast with fog. No rain occurred during the measurements nor were any temperature inversions noted. The acoustical effect of these mild weather conditions on the measurements is considered to be negligible due to the relatively short propagation distances between the noise sources and the microphone.

Data Analysis

The data were analyzed in terms of L_{10}, L_{50}, L_{90} and L_{eq} (definitions are in Section V.H main text) for several reasons. The L_{10} is used by the City and County of San Francisco to evaluate impact caused by increases in traffic noise. The L_{50}, or average sound level, is used by San Francisco to assess the construction noise impact. The L_{90}, or background noise level, is used by the City and County of San Francisco for determining acoustical impact due to steady-state noise sources such as mechanical equipment on and in buildings./1/ The L_{eq} (energy-averaged level) is the basic unit of measurement for determining the CNEL (Community Noise Equivalent Level (CNEL) is the 24-hour average level adjusted to an equivalent level with a weighting applied to account for the lower tolerance of people during the evening and nighttime hours).

The tape-recorded data were analyzed with a real-time analyzer coupled to a programmable calculator./2/ The calculator automatically computed the noise levels listed in the tables. The acoustical calibration signal on the tape recording was used to adjust the analyzer to indicate the correct noise level. In addition, the B&K 166/S.45 Environmental Noise Classifier was used to analyze tape-recorded samples. In a backup technique, the noise descriptors (such as L_{10}, L_{50}, etc.) were calculated manually from the statistical data. These two systems are both suitable for achieving the necessary precision in analyzing environmental noise data ($\pm$ 0.5 dBA), but the real-time analyzer has the advantage of minimizing human error.

APPENDIX H, TABLE H-1

AMBIENT NOISE MEASUREMENT POSITIONS* IN THE REDEVELOPMENT AREA

Site	Description
A	Hawthorne between Folsom and Howard 25' from center line of street.
B	Harrison between Hawthorne and Third (in parking lot across from 665 Harrison) about 50' from near lane
C	East corner of Harrison and Third (in parking lot) 50' from near lane of each street
D	Harrison (in Metro parking lot directly across from 735 Harrison) about 50' from near lane
E	Fourth (in U-Park & Lock) directly across from 345 Fourth, about 50' from Fourth and Shipley near lanes
F	South side of Folsom (U-Park & Lock) between Third and Fourth, about 50' from Folsom near lane
G	Third between Howard and Folsom about 50' from Third near lane
H	North side of Fourth between Folsom and Howard 50' from Fourth near lane, directly across from 250 Fourth
I	East corner of Howard and Third, about 100' from near lane of each street
J	East corner of Mission and Third (in Metro parking lot) about 150' from intersection and about 50' from Mission near lane
K	North corner of Fourth and Mission (at demolition site; microphone was mounted on mound above street level) about 80' from Mission near lane, 100' from Fourth near lane
L	North side of Fourth about 120' northwest of intersection with Howard, about 50' from Fourth near lane
M	Off Clementina on Gallagher about 50' from center of Gallagher, on housing project's lawn
N	South corner of Third and Folsom (U-Park & Lock), 100' from near lane of each street

*See Figure 18, page 173 of main text.

APPENDIX H, TABLE H-1 (continued)

Site	Description
O	South side of Third between Mission and Howard, about 50' from near lane of Third
P	In middle of block bounded by Howard, Folsom, Third and Fourth (Metro parking lot)
Q	In middle of block bounded by Mission, Howard, Third and Fourth (parking lot)
R	South side of Market between Third and Fourth, 100' from near lane of Market
S	On Second between Folsom and Howard, 8' from near lane of Second
U	South side of Mission between Third and New Montgomery at curbside
V	On Clementina west of Fourth (near Clementina Towers) at curbside
W	North side of Mission, between Fourth and St. Patrick's Church, at curbside
X	On Harrison, between Hawthorne and Third, opposite Golden Gate Recording Studios, at curbside
Y	On south side of Howard 75' west of Fourth (at TODCO Housing site), second floor outside
Z	South side of Howard between Third and Hawthorne

Noise Measurements

Measurements were taken two or more times at most sites during various times of the day or night to improve statistical validity of the data. Construction activity precluded measurements at a few sites during some time periods. The data were measured in 15-minute samples for spot-checking levels at various locations and to accumulate the maximum number of valid samples within the available time schedule. Tables H-2, H-3 and H-4 show the 15-minute measurements between 8:00 a.m. and 12:00 noon, between 12:00 noon and 6:00 p.m., and between 6:00 p.m. and 10:00 p.m., respectively.

Twenty-four-hour and 48-hour measurements also were taken to comply with HUD and California noise assessment standards. The measured data at Sites U, V, W, X, Y and Z are displayed in Tables H-5 through H-12, pages 138 to 142, respectively. Some of the data were analyzed in three-hour increments since hour-to-hour data variations were found to be statistically meaningless. The data recorded from 7:00 p.m. to 10:00 p.m. were segregated to facilitate the CNEL computation (results shown in the same tables).

The 15-minute samples were obtained with a Bruel & Kjaer (B&K) Model 166/S.45 Environmental Noise Classifier./3/ A B&K 2219 Sound Level Meter was used to verify that the B&K 166/S.45 was operating properly. The amplified A-weighted/4/ signal from this sound level meter was fed into the B&K 166/S.45 (rather than a direct microphone input into the B&K 166/S.45); this took advantage of the dynamic range and accurate weighting network available from the sound level meter.

Twenty-four-hour measurements were taken with a microsampling system consisting of the following instruments: Bruel & Kjaer (B&K) 4230 Calibrator; B&K 2219 Sound Level Meter with AC output; Uher CR134 Tape Recorder; Microsampling Timer; Control cables and external battery. This equipment was mounted in a metal box approximately 12' above the ground on utility and Muni Railway poles, to protect it from theft or vandalism. This microsampling process has proven to be accurate both experimentally and in community noise applications.

During the recording process, the amplified microphone signal was periodically monitored by the operator with a headset. This precaution insured that extraneous signals (electrical noise, hum, static, etc.) were not interfering with the recording of environmental acoustical data.

APPENDIX H, TABLE H-2

MEASURED NOISE LEVELS IN THE REDEVELOPMENT AREA
15-MINUTE MEASUREMENTS BETWEEN 8:00 AM AND 12:00 NOON

Site	Date	Time*	L_{10}	L_{50}	L_{90}	L_{eq}
A	7/13/77 W	11:10 AM	74	69	62.5	70
	7/19/77 Tu	8:34 AM	71	64.5	61	66
B	7/13/77 W	11:40 AM	65	60.5	58	62
	7/18/77 M	10:32 AM	65	61	59	63
C	7/18/77 M	10:51 AM	72	68.5	65.5	69
	7/19/77 Tu	9:20 AM	72	68.5	66	68
D	7/20/77 W	9:26 AM	64	61	60	61
E	7/20/77 W	9:53 AM	68	60	57	64
F	7/18/77 M	11:34 AM	64	59.5	57	63
G	7/18/77 M	10:13 AM	67	63	60	63
	7/20/77 W	10:20 AM	66	60	56	62
H	7/18/77 M	9:48 AM	66	61	57	63
I	7/19/77 Tu	10:56 AM	64	59.5	59	60
	8/03/77 W	8:56 AM	64	59	58	61
J	7/14/77 Th	8:19 AM	71	67	63	68
	7/19/77 Tu	11:12 AM	65	61	58	62
K	7/14/77 Th	8:53 AM	66	61	59	63
	7/19/77 Tu	11:37 AM	67.5	61	59	65
L	7/14/77 Th	9:39 AM	66	60	55	62
M	7/14/77 Th	10:20 AM	66.5	61	56.5	62
N	7/14/77 Th	10:52 AM	62.5	59	56	59
P	7/20/77 W	10:48 AM	58	55	54	56
	8/03/77 W	9:37 AM	59	56	52.5	57
Q	7/20/77 W	11:17 AM	58	55	54	55

*Start of measurement

NOTE: Sound levels in dBA. Definitions appear in the text (Section V-H, page 171). No measurement at site "O" because of construction activities.

APPENDIX H, TABLE H-3

MEASURED NOISE LEVELS IN THE REDEVELOPMENT AREA
15-MINUTE MEASUREMENTS BETWEEN 12:00 NOON AND 6:00 PM

Site	Date	Time	L_{10}	L_{50}	L_{90}	L_{eq}
B	7/21/77 Th	1:29 PM	64	62	59	62
	8/02/77 Tu	5:24 PM	64	59	56.5	63
C	7/21/77 Th	1:56 PM	72	69	67	67
D	7/13/77 W	1:00 PM	66.5	62	59.5	63
E	7/13/77 W	1:40 PM	69	62.5	58	66
	8/02/77 Tu	4:54 PM	68	64	58	66
F	7/13/77 W	2:24 PM	64	59	56.5	62
G	7/13/77 W	2:56 PM	64	60	57.5	60
H	7/13/77 W	4:40 PM	67.5	64	61	64
I	7/13/77 W	5:25 PM	69	65	62.5	66
	7/18/77 M	12:10 PM	63	60.5	59	60
J	7/18/77 M	1:07 PM	70.5	66	63	67
K	7/18/77 M	1:37 PM	66	61	57	63
	8/02/77 Tu	4:21 PM	65	59	55.5	61
L	7/18/77 M	2:02 PM	64	61	58.5	61
M	7/18/77 M	2:27 PM	67.5	61	56	65
N	8/03/77 W	3:26 PM	63	59	57	61
O	7/18/77 M	2:57 PM	63	60	58	60
P	8/02/77 Tu	1:55 PM	59.5	56.5	55	58
Q	8/02/77 Tu	2:31 PM	60.5	57	55.5	59
R	8/02/77 Tu	3:44 PM	63.5	59.5	56.5	61
S	8/02/77 Tu	3:02 PM	72.5	65	60.5	69

NOTE: Sound levels in dBA. No measurements at Site A because of construction activities.

APPENDIX H, TABLE H-4

MEASURED NOISE LEVELS IN THE REDEVELOPMENT AREA
15-MINUTE MEASUREMENTS BETWEEN 6:00 PM AND 10:00 PM

Site	Date	Time	L_{10}	L_{50}	L_{90}	L_{eq}
A	7/14/77 Th	8:40 PM	64	59	56	62
B	7/19/77 Tu	6:44 PM	65	61	60	62
C	7/19/77 Tu	7:06 PM	72.5	69	66	69
D	7/14/77 Th	6:37 PM	66	61.5	60	63
E	7/14/77 Th	7:02 PM	71.5	62	57.5	64
F	7/19/77 Tu	7:29 PM	63	59	56.5	59
G	7/14/77 Th	8:13 PM	66	60	58	62
H	7/14/77 Th	7:52 PM	65.5	68.5	57.5	61
I	7/19/77 Tu	7:49 PM	67.5	61	58	63
J	7/19/77 Tu	8:14 PM	66	61	57	62
K	7/19/77 Tu	8:34 PM	61	56	53.5	57
L	7/19/77 Tu	8:58 PM	63.5	58	55	59
M	7/14/77 Th	7:28 PM	59.5	55	54	56
N	8/02/77 Tu	8:33 PM	61	57	54	59
O	8/02/77 Tu	9:07 PM	62	57	55.5	59
P	8/02/77 Tu	6:59 PM	59	56	55	58
Q	8/02/77 Tu	7:24 PM	58	53	53	56
R	8/02/77 Tu	7:53 PM	62	57	56	60
S	8/02/77 Tu	8:14 PM	79	69	64	75

NOTE: Sound levels in dBA

APPENDIX H, TABLE H-5

MEASURED NOISE LEVELS AT SITE U ON MISSION BETWEEN THIRD AND NEW MONTGOMERY STS., 3-4 AUGUST 1977

Period	L_{10}	L_{33}	L_{50}	L_{90}	L_{eq}
12:30-1:00 PM Wed.	75	72	70	65.5	72
1:00-4:00	75	72	70.5	67.5	71.5
4:00-7:00	76	73	72	67	74
7:00-10:00	73	69	67	60	69
10:00-1:00 AM Thur.	72	68	66	61	69
1:00-4:00	70	66	63	57	67
4:00-7:00	68	62	59	54	65
7:00-10:00	75.5	71	70	63.5	71.5
10:00-12:30 PM	76	72.5	71	67	72

L_{33}(24-hour) = 69

CNEL = 75

NOTE: Sound levels in dBA

APPENDIX H, TABLE H-6

MEASURED NOISE LEVELS AT SITE W ON MISSION BETWEEN FOURTH ST. AND ST. PATRICK'S CHURCH, 2-3 AUGUST 1977

Period	L_{10}	L_{33}	L_{50}	L_{90}	L_{eq}
1:00-4:00 PM Tues.	74	70	68	64	70
4:00-7:00	77	72	70	65	71
7:00-10:00	71	66	63	59	66
10:00-1:00 AM Wed.	69	63	62	56	64
1:00-4:00	64	58	56	50	59
4:00-7:00	65	59	55	49	60
7:00-10:00	73	69	67	62	69
10:00-1:00 PM	74	70	68	63	69

L_{33}(24-hour) = 68

CNEL = 71

NOTE: Sound levels in dBA.

APPENDIX H, TABLE H-7

MEASURED NOISE LEVELS AT SITE V ON CLEMENTINA BETWEEN FOURTH AND GALLAGHER STS., 4-5 AUGUST 1977

Period	L_{10}	L_{33}	L_{50}	L_{90}	L_{eq}
1:00-4:00 PM Thur.	74	67	65	60	68
4:00-7:00	69	64	62	59	65
7:00-10:00	65	61	59	56	60
10:00-1:00 AM Fri.	61	58	56	54	58
1:00-4:00	62	55	53	50	58
4:00-7:00	63	56	54	50	58
7:00-10:00	70	63	61	57	67
10:00-1:00 PM	72	64	62	59	66

L_{33}(24-hour) = 62

CNEL = 67

NOTE: Sound levels in dBA

APPENDIX H, TABLE H-8

MEASURED NOISE LEVELS AT SITE X ON HARRISON BETWEEN HAWTHORNE AND THIRD STS. 26-27 JULY 1977

Period	L_{10}	L_{33}	L_{50}	L_{90}	L_{eq}
5:30-7:00 PM Tues.	71	68	67	64	68
7:00-10:00	69	65	64	62	67
10:00-11:00	66	64	63	62	65
11:00-2:00 AM Wed.	67	64	63	57	66
2:00-5:00	62	59	57	54	61
5:00-7:00	68	64	62	57	64
7:00-10:00	75	72	70	66	72
10:00-1:00 PM	75	71	69	67	71
1:00-2:30	72	70	69	67	70
2:30-4:30	73	70	69	66	71
4:30-6:30	74	71	70	68	72

L_{33}(24-hour) = 68

CNEL = 72

NOTE: Sound levels in dBA

APPENDIX H, TABLE H-8 (continued)

27-28 JULY 1977

Period	L_{10}	L_{33}	L_{50}	L_{90}	L_{eq}
7:00-10:00 PM Wed.	67	67	63	60	64
10:00-1:00 AM Thur.	66	62	61	57	63
1:00-4:00	63	57	55	52	58
4:00-7:00	65	62	59	52	60
7:00-10:00	.72	68	67	64	68
10:00-1:00 PM	72	68	67	64	68
1:00-4:00	72	70	68	64	69
4:00-7:00	72	69	68	63	68

L_{33}(24-hour) = 67

CNEL = 69

APPENDIX H, TABLE H-9
MEASURED NOISE LEVELS AT SITE Y, 811-815 HOWARD ST. (NEAR FOURTH)
21-22 JULY 1977

Hour	L_{10}	L_{33}	L_{50}	L_{90}	L_{eq}
3:00-4:00 PM Thur.	76	73	72	68	73
4:00-5:00	77	74	73	70	74
5:00-6:00	76	74	73	69	73
6:00-7:00	73	71	69	65	70
7:00-8:00	71	67	66	62	68
8:00-9:00	71	67	65	61	70
9:00-10:00	70	66	64	61	67
10:00-11:00	70	67	64	60	67
11:00-12:00	69	65	63	59	67
12:00-1:00 AM Fri.	70	65	63	58	67
1:00-2:00	66	62	59	56	64
2:00-3:00	67	61	58	55	65
3:00-4:00	63	58	56	55	60
4:00-5:00	60	57	56	54	57
5:00-6:00	65	59	58	54	62
6:00-7:00	69	64	62	58	66
7:00-8:00	76	70	68	65	72
8:00-9:00	74	72	70	66	71
9:00-10:00	75	70	68	64	73
10:00-11:00	75	72	70	66	73
11:00-12:00	76	72	70	66	73
12:00-1:00 PM	74	71	70	66	71
1:00-2:00	77	73	72	67	73
2:00-3:00	74	72	71	67	72

L_{33}(24-hour) = 70

CNEL = 74

APPENDIX H, TABLE H-10

MEASURED NOISE LEVELS AT SITE Y, 811-815 HOWARD ST. (NEAR FOURTH)
8-9 JUNE 1977

Hour	L_{10}	L_{33}	L_{50}	L_{90}	L_{eq}
3:00-4:00 PM Wed.	77	74	73	70	75
4:00-5:00	78	76	75	72	76
5:00-6:00	78	76	74	72	76
6:00-7:00	77	74	72	68	75
7:00-8:00	74	70	70	67	77
8:00-9:00	72	70	68	66	70
9:00-10:00	71	68	66	64	68
10:00-11:00	72	68	67	64	69
11:00-12:00	70	67	66	64	67
12:00-1:00 AM Thur.	72	65	64	61	68
1:00-2:00	70	66	66	63	67
2:00-3:00	66	62	62	59	64
3:00-4:00	63	58	57	54	61
4:00-5:00	64	58	56	54	65
5:00-6:00	64	58	57	54	62
6:00-7:00	72	64	62	59	68
7:00-8:00	76	70	66	61	72
8:00-9:00	76	72	70	64	74
9:00-10:00	77	73	70	64	74
10:00-11:00	78	74	72	66	76
11:00-12:00	76	72	70	66	74
12:00-1:00 PM	78	74	72	66	74
1:00-2:00	76	73	72	65	73
2:00-3:00	80	72	70	66	76

L_{33}(24-hour) = 71

CNEL = 75

NOTE: Sound levels in dBA

APPENDIX H, TABLE H-11
MEASURED NOISE LEVELS AT SITE Z ON HOWARD BETWEEN THIRD AND HAWTHORNE STS.
5-6 AUGUST 1977

Period	L_{10}	L_{33}	L_{50}	L_{90}	L_{eq}
2:00-4:00 PM Fri.	75	72	71	66	71
4:00-7:00	77	73	72	68	74
7:00-10:00	71	67	66	62	67
10:00-1:00 AM Sat.	70	66	62	60	66
1:00-4:00	68	63	61	56	64
4:00-7:00	67	61	58	54	62
7:00-10:00	71	67	65	61	67
10:00-1:00 PM	72	68	67	63	67
1:00-4:00	70	68	67	62	68
4:00-7:00	73	69	67	64	69
7:00-10:00	71	66	64	60	67
10:00-1:00 AM	70	65	64	60	66

Saturday L_{33}(24-hour) = 66

Saturday CNEL = 72

APPENDIX H, TABLE H-12
MEASURED NOISE LEVELS AT SITE Z ON HOWARD BETWEEN THIRD AND HAWTHORNE STS.
7-8 AUGUST 1977

Period	L_{10}	L_{33}	L_{50}	L_{90}	L_{eq}
1:00-4:00 AM Sun.	68	62	61	56	65
4:00-7:00	64	58	56	53	60
7:00-10:00	70	65	62	57	65
10:00-1:00 PM	72	68	66	61	68
1:00-4:00	73	66	65	60	66
4:00-7:00	71	68	66	62	67
7:00-10:00	69	65	63	60	65
10:00-1:00 AM Mon.	68	64	62	58	64
1:00-4:00	65	59	57	54	60
4:00-7:00	66	62	60	54	64
7:00-10:00	77	73	71	66	72
10:00-1:00 PM	76	71	69	65	71
1:00-2:50	75	72	70	66	71

Sunday L_{33}(24-hour) = 64

Sunday CNEL = 71

2. NOISE CRITERIA (IMPACT)

This section summarizes the noise criteria applicable to the YBC area.

a. Criteria for Haul Routes. The change in the L_{10} along the alternate routes due to haul truck traffic was used to assess noise impact.

b. Criteria for Construction Noise. The criteria that apply to construction activities in San Francisco are in Ordinance 274-72, "Regulation of Noise", Sec. 2907, adopted 10 August 1973. The ordinance requires that all powered construction equipment, except impact tools and equipment, not emit more than 80 dBA, measured at 100 feet. Impact tools and equipment including pavement breakers and jackhammers must have both intake and exhaust muffled to the satisfaction of the Director of Public Works. The ordinance requires a special permit for construction after 8:00 p.m. and before 7:00 a.m.

c. Criteria for Post-construction Noise Levels. The impact criteria for post-construction noise in the Redevelopment Area depend on the land use. The applicable criteria are:

(1) Housing

California Standards. All multi-family housing in the area must meet the requirements of the California Noise Insulation Standards, Title 25, Chapter 1, Subchapter 1, Article 4, of the California Administrative Code. The standard requires that noise levels in any habitable room not exceed 45 CNEL. In order to insure that the interior standard is met, the law further requires that multi-family dwellings to be located within an annual exterior CNEL contour of 60 dB adjacent to traffic arteries shall require an acoustical analysis showing that the proposed building has been designed to limit intruding noise to the allowable interior noise level.

HUD Standards. Housing financed by the Department of Housing and Urban Development (HUD) is under the control of Departmental Circular 1390.2, "Noise Abatement and Control". HUD discourages the construction of new dwelling units on sites which have or are projected to have unacceptable noise exposure. The HUD external noise criteria are:

General External Exposures (dBA)

Unacceptable

- Exceeds 80 dBA 60 minutes per 24 hours
- Exceeds 75 dBA 8 hours per 24 hours

- o Exceptions are strongly discouraged and require a 102(2)c Environmental Statement and the Secretary's approval.

Discretionary - Normally Unacceptable

- o Exceeds 65 dBA 8 hours per 24 hours
- o Loud repetitive sounds on site
- o Approvals require noise attenuation measures, the Regional Administrator's concurrence and a 102(2)c Environmental Statement.

Discretionary - Normally Acceptable

- o Does not exceed 65 dBA more than 8 hours per 24 hours.

Acceptable

- o Does not exceed 45 dBA more than 30 minutes per 24 hours.

The external noise criteria apply to rest areas, patios, balconies with furniture, and private yards.

In addition to the exterior noise standard, HUD also has a standard for interior noise exposure. Noise levels in sleeping quarters are considered "acceptable" if interior noise levels resulting from exterior noise sources and from building equipment such as heating, plumbing, and air conditioning:

- o Do not exceed 55 dBA for more than an accumulation of 60 minutes in any 24-hour period, and
- o Do not exceed 45 dBA for more than 30 minutes during nighttime sleeping hours from 11:00 p.m. to 7:00 a.m., and
- o Do not exceed 45 dBA for more than an accumulation of eight hours in any 24-hour day.

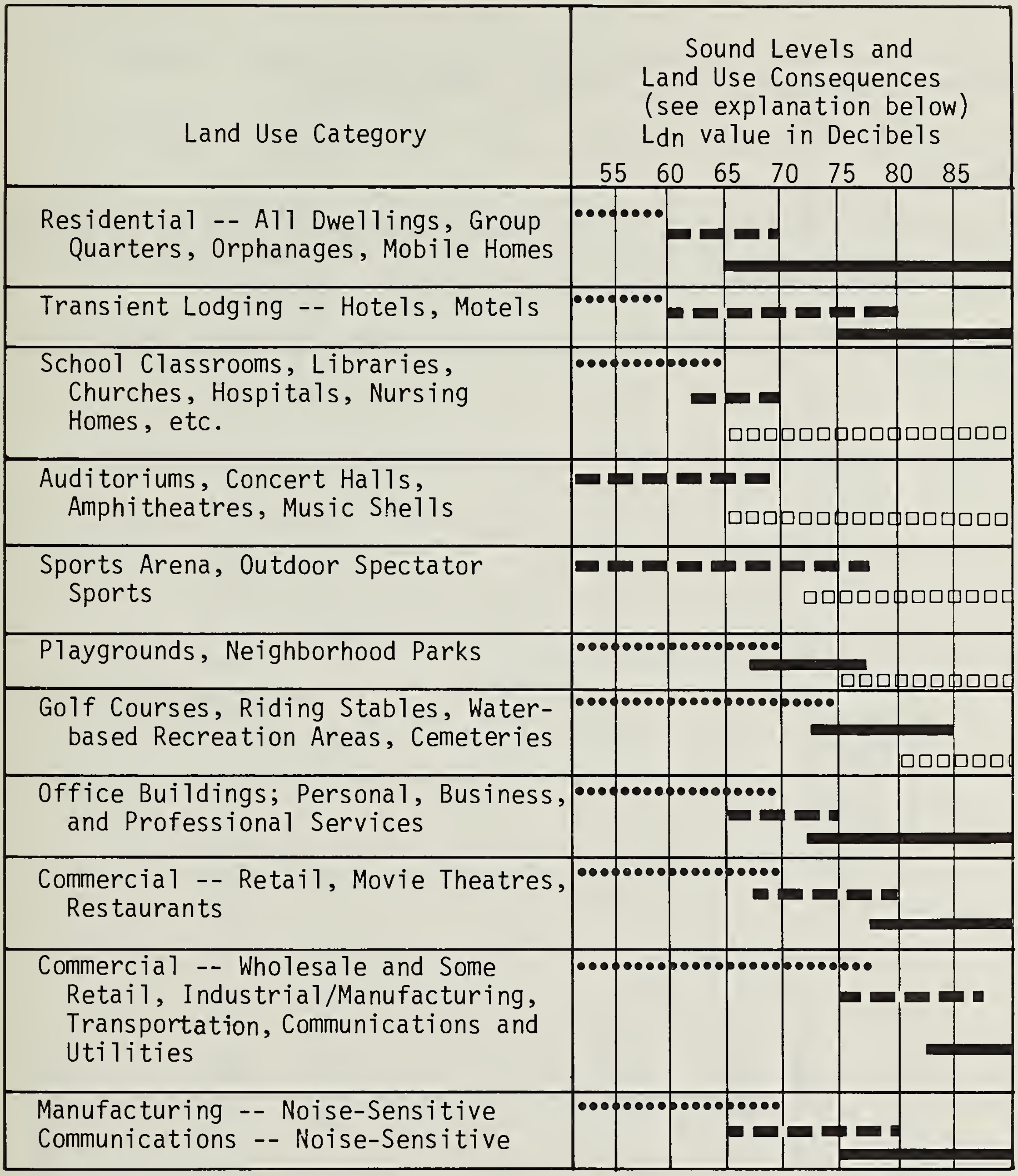
Noise levels in other interior areas are judged on a case-by-case basis by HUD personnel. Consideration is given to the characteristics of the noise, the duration, time of day, and planned use of the area.

(2) Other Types of Development

The criteria for residential, office, commercial, light industrial and other types of development are stated in the Transportation Noise Element of San Francisco's General Plan. These goals are shown in Figure H-1.

FIGURE H-1

LAND USE COMPATIBILITY CHART FOR COMMUNITY NOISE*



Explanation of Land Use Consequences

Satisfactory, with no special noise insulation requirements.

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

New construction or development should generally not be undertaken.

*Transportation Noise Element of the Comprehensive Plan of San Francisco, San Francisco Department of City Planning, August 1974.

FOOTNOTES

/1/Conversation with Cormac Brady, Senior Mechanical Engineer, San Francisco Department of Public Works, February 1977.

/2/B&K 3347 Real-Time Analyzer, B&K 183 Interface, Tektronix 31 Calculator.

/3/The Model 166/S.45 is a self-contained instrument which can generate a statistical distribution of environmental noise. It divides the noise level into 12 amplitude classes, each of which is 2.5 dBA wide.

/4/Definitions of terms appear in the text (Noise Setting, Section V.H, page 171).

APPENDIX I: RESOURCE USE

TABLE I-1: CALCULATIONS FOR CONSUMPTION OF WATER BY DISCRETIONARY USES IN YBC: 1988

Land Use Category	Estimating Factor /1/	Alternative A Unit (sq ft)/2/	Alternative A Gallons/ Day	Alternative 8 Unit (sq ft)/2/	Alternative 8 Gallons/ Day	Alternative C Unit (sq ft)/2/	Alternative C Gallons/ Day	Alternative D Unit (sq ft)/2/	Alternative D Gallons/ Day
Office	125 gal/1000/day	6,214,450	776,750	2,631,625	329,000	1,302,300	195,300/3/	3,317,823	497,700/3/
Retail Commercial	200 gal/1000/day	676,550	135,400	341,075	68,200				
Pedestrian Concourse	30 gal/100/day /4/	163,220	4,890	80,720	2,430	80,720	2,430	----	----
Hotel Rooms	200 gal/room/day /5/	700 Rooms	140,000	----	----	----	----	----	----
Convention Facility:									
Visitors	5 gal/vis/day /6/	2700 vis/day /7/	13,500	2700 vis/day /7/	13,500	----	----	----	----
Employees	20 gal/emp/day	800 emp/day	16,000	800 emp/day	16,000	----	----	----	----
Downtown Support	100 gal/1000/day	----	----	----	----	----	----	6,336,584	633,660
Light Industrial	100 gal/1000/day	1,077,450	107,700	342,875	34,280	359,378	35,900	1,551,704	155,170
Public Park	60 gal/1000/day /4/	450,000	27,000	----	----	908,600	54,516	----	----
Commercial Entertainment	100 gal/1000 day	400,000	40,000	----	----	----	----	----	----
Rec/Entertainment Park:									
Visitors	5 gal/vis/day	----	----	17800 vis/day /8/	89,000	----	----	----	----
Grounds	60 gal/1000/day /4/	----	----	756,800	45,420	----	----	----	----
Housing:									
Family	200 gal/DU/day /5/	----	----	300 DU	60,000	300 DU	60,000	----	----
Market Rate	200 gal/DU/day /5/	50 DU	10,000	650 DU	130,000	1000 DU	200,000	----	----
			1,271,240		787,830		584,146		1,286,530
TOTAL CONSUMPTION			1.27 mgd/9/ (464 mg/yr)		0.788 mgd (288 mg/yr)		0.584 mgd (200 mg/yr)		1.29 mgd 470 mg/yr)

See following page for listing of footnotes.

FOOTNOTES

/1/ Unless otherwise noted, taken from: Brown and Caldwell, Consulting Engineers, Report on Wastewater Loading from Selected Redevelopment Areas, February, 1972.

/2/ Square feet unless otherwise noted.

/3/ Combined office retail-commercial consumption computed at 150 gal/ 1,000 square ft./day.

/4/ Park irrigation calculated at 3-acre-feet of water per acre each year, concourse irrigation calculated at one-half this amount.

/5/ Metcalf and Eddy, Wastewater Engineering: Collection, Treatment, Disposal, McGraw-Hill, 1972.

/6/ Estimating factor of 5 gallons per visitor per day provided by convention center architects.

/7/ High annual attendance figure of 985,000 visitors based on total annual 1976 attendance of 973,000 at similar Los Angeles Convention Center and estimated convention use only attendance figure of 475,000 in 1988 provided by R. Sullivan, General Manager, San Francisco Visitors and Convention Bureau, telephone communication, August 22, 1977.

/8/ Based on high annual recreation/entertainment park attendance of 6,500,000 people estimated by R. Gryziec, letter dated July 26, 1977.

/9/ Million gallons per day.

APPENDIX J: GEOLOGY AND SEISMOLOGY

STRATIGRAPHY

Geologic materials in YBC are of two major types: bedrock and unconsolidated sediments. Franciscan Formation rocks which underlie most of San Francisco are present in the project area. Franciscan rocks are a complex assemblage of predominantly sedimentary rocks with smaller amounts of volcanic and metamorphic rocks. The sedimentary rocks contain fossils which indicate a Cretaceous age (about 130 million years old) in this area. The rocks are characterized by lateral changes in lithology, and have been extensively folded, shattered, sheared and intruded by serpentine and volcanic greenstone. Franciscan rock, termed "melange", consists of rounded fragments of hardrock in a matrix of soft, plastic, waxy material. The melange was formed by shearing of Franciscan rocks (sliding of the rock layers under friction). Sheared Franciscan rock is generally unstable and forms a poor foundation base. Franciscan melange may form part of the bedrock below YBC. The weathering of Franciscan rocks in the project area produces soils which range between sandy clay and clayey sand.

Most of YBC is located in an area of unconsolidated sediments. The thickness of these sediments is variable, in part because the bedrock surface upon which they were deposited is irregular. Outcrops of the bedrock are in fact the tops of hills which poke through the younger unconsolidated sands and mud. In general, the depth of the unconsolidated sediments (i.e., the depth of the bedrock surface) increases toward the north, away from the bedrock exposure on Rincon Hill. Borings at selected sites/1/ indicate this trend, e.g., at Third and Perry Sts., 50 feet of sediment cover; at Fourth and Jessie Sts., 172 feet of sediments; at Stevenson and Annie Sts., 197 feet of sediments; at Mission and Second Sts., 259 feet of sediments. Borings/2/ indicate that in CB-3 the top of the bedrock surface lies at elevation -120 feet (all elevations with respect to San Francisco datum unless otherwise noted) near Third and Folsom Sts. and falls to -245 feet in CB-2./3/

The unconsolidated sediments which rest upon the Franciscan bedrock are formed in a series of variable and irregularly placed beds. The oldest of the sediments is called the "older bay mud," and rests directly on the anciently eroded surface of the Franciscan bedrock. The mud varies in thickness, from thin deposits to as much as 200 feet in the central portion of San Francisco Bay. A thickness of roughly 100 feet to 150 feet of the mud is found in the YBC area/4/. The borings/2/ in CB-2 and CB-3 indicate that the top of the older bay mud lies between -65 feet in the central portion of CB-3 and -90 feet in the southeastern corner of the same block./5/ The older bay mud is mostly firm, silty clay with lenses of sand and pebbles.

The older bay mud is covered with a more recent deposit of sand, called the Colma formation. The Colma sand is interfingered with mud deposits, but is predominantly well-sorted sand. In this portion of San Francisco the sand has persistent, horizontal stratification, but in places it

has interfingered, steeply inclined cross beds./4/ The Colma formation is mostly a water-and-gravity-laid deposit, but some may be wind-laid. The Colma sand is fine- to medium-grained with small to moderate amounts of silt and clay, and has a light brown to gray color. The deposit is roughly 20 to 50 feet thick in the YBC area. The top of this layer varies in elevation from -14 feet to -29 feet near Howard and Fourth Sts., but rises toward the east to -5 feet in the northeastern and southeastern corners of CB-2 and CB-3./6/

The Colma sand is covered by "younger bay mud" and dune sand. The younger bay mud is interfingered with the dune sand. The younger bay mud is further subdivided into a lower semi-consolidated layer and an upper soft layer./7/ As a whole, the younger bay mud is a gray, plastic, silty clay with some lenses of sand, peat and shell fragments. In the YBC area it is probably less than 10 feet thick in most places. The Dames and Moore Co. borings indicate that the surface of this mud layer lies above elevation 0 in the southeastern corner of CB-3 and slopes westward to below -20 feet near the intersection of Howard and Fourth Streets./8/ The bay mud was the surficial deposit in the southwestern portion of the area (SB-1 and SB-2, and WB-3) during historical times when a tidal mud flat and marsh existed around Mission Bay. That tidal flat was later covered with artificial fill.

In most of YBC, the younger bay mud is sandwiched between dune sands. In these areas, a layer of dune sand rests directly on the Colma sand formation. The dune sand is, in turn, overlain by the younger bay mud and those mud deposits are covered by more dune sand. Dune sand covers most of YBC at the surface; just over one-half of the City of San Francisco is covered by a variable thickness of such sand. The dune sands are wind-carried deposits laid by the prevailing winds from the Pacific Ocean. The dune sand is clean, well-sorted, fine- to medium-textured material. Its color varies from brown to light grey. The dune sand ranges in thickness from under 50 feet to over 100 feet. The surficial sand dunes have been leveled and graded in the area.

The southwestern and eastern portions of YBC are covered with artificial fill. Areas along the San Francisco Bay waterfront were marshy or open tidal mud flats (comprised of younger bay mud) which were covered with assorted types of debris in the years following 1849. The artificial fill consists largely of dune sand and includes silt, clay, rock waste from excavations, man-made debris and organic waste. In the northeastern portion of YBC, in EB-2 and EB-3, the artificial fill is 30 feet deep. In the southwestern portion in SB-1, SB-2 and WB-3, the artificial fill is thinner, generally 10 to 20 feet in depth. The artificial fill was dumped on top of the younger bay mud. At the time of the 1906 earthquake, damage to structures built on this surface resulted from failure of these materials./9/

No minerals of commercial value have been located in the YBC area./2/

STRUCTURAL GEOLOGY AND SEISMICITY

The major faults which could affect the site are the San Andreas and the Hayward faults. Major earthquakes (that is earthquakes with a Richter magnitude of 6 or greater) affecting the San Francisco Bay region occurred on the San Andreas fault in 1838, 1865, and 1906, and on the Hayward fault in 1836 and 1868./10/ Many minor earthquakes and tremors have occurred on those faults in historic times./11/ The locations of earthquake epicenters (the geographic location on the earth's surface above the focus of an earthquake) suggest that other active faults occur in the San Francisco Bay, but data are too meager to identify them.

As a whole, the Franciscan bedrock is sheared and shattered. Two major shear zones occur in the bedrock of San Francisco, both trending roughly northwest to southeast. YBC is located just to the east of the easternmost shear zone, which extends between Fort Point and Potrero Point. This shear zone may dip eastard at a low angle and hence may lie below the surface at the YBC site. The forces which produced the shear zone are no longer active, but the melange bedrock contains abundant platey minerals and is potentially unstable.

SEISMIC HAZARDS

An earthquake comparable to the 1906 San Francisco earthquake would be expected to produce ground shaking of varying intensity in the city. Five general levels of intensity have been described:/12/

"Very Violent." Cracking and shearing of rock masses. Deep and extended fissuring in soil, many large landslides and rockfalls.

"Violent." Fairly general collapse of brick and frame structures when not unusually strong. Serious cracking of better buildings. Lateral displacement of streets, bending of rails and ground fissuring.

"Very Strong." Masonry badly cracked with occasional collapse. Frame buildings lurched when on weak underpinning with occasional collapse.

"Strong." General but not universal fall of brick chimneys. Cracks in masonry and brick work.

"Weak." Occasional fall of brick chimneys and plaster.

The intensity of ground shaking would be dependent primarily upon the geographic position relative to the epicenter of the earthquake, and the geologic materials at the site. The effects of geologic materials on ground shaking were described in Section V.J of this report. Strong, very strong and violent ground shaking would occur in YBC during such an earthquake.

Earthquakes may induce liquefaction of water-saturated loose silt, sand, and gravel. The liquefaction may occur in the surface material or

in a layer at some depth below firmly compacted materials at the surface. In the latter case, the buried liquefied layer may reduce friction in the movement of one material past other material./13/ In both cases, liquefaction results in sudden ground failure, because of the loss of the shear strength of the material (the internal resistance offered to the stress that otherwise tends to cause two adjacent parts of a solid to slide past one another parallel to the plane of contact).

Granular material with a small clay content and a uniform grainsize distribution generally has the greatest potential for liquefaction. Such sediments are usually silts, sands or gravels and must lie within or beneath the groundwater table/14/. Artificial man-made fill which has been deposited on soft bay mud or unconsolidated sand possesses liquefaction hazard potential.

Two types of ground failure in the YBC area might result from liquefaction of artificial fill induced by an earthquake: lateral-spreading landsliding and bearing-capacity failure. Because of the gentle slopes of the site (about 0.8%), a third type of failure, flow landsliding, probably would not occur. During the 1906 earthquake, liquefaction produced lateral-spreading landslides with movement of the unconsolidated material toward Rincon Hill. Pulled-apart curbs, walks and rails occurred at the upper end and to a smaller extent along the margin of the slide. Buckled curbs, walks and rails formed where the landslide butted into Rincon Hill. Water lines were broken by the lateral displacement/15/.

Failure of bearing capacity of the ground material could occur in zones of liquefaction hazard potential. Loss of foundation support, subsidence of structures, and the buoyant rise of buried objects could occur where bearing capacity failed. This type of failure apparently did not occur in the South-of-Market area in 1906. A basement in an area northeast of YBC filled with sand during the 1906 earthquake, which suggests a quicksand condition/15/.

Slow subsidence of the ground surface has occurred in the South-of-Market area./9/ Buildings have sunk below street level, and/or are tilted because of differential settlement below the structure. Earthquakes can induce rapid, uneven subsidence. Some structures collapsed or were severely damaged by such subsidence during the 1906 earthquake with injury and loss of life. The hazard of such rapid subsidence induced by a maximum intensity earthquake is greatest in reclaimed land with artificial fill overlying compressible bay mud and loose sand. In YBC, the area of potential subsidence hazard is coincident with such geological conditions, and hence coincident geographically with the area of potential liquefaction hazard.

YBC is located in a relatively protected site with regard to a tsunami incursion. As a result, for the 100-year tsunami, the probable run-up on the shore near YBC would be 4.8 feet, for the 500-year case, 8.0 feet./16/ (Tsunami and seiche run-up elevations in this section are based on mean sea level datum - MSL.) Because all portions of YBC lie above 10 feet MSL, it is expected that the site is not subject to tsunami inundation hazard. The 1906 earthquake did not produce a seiche of any significance in San Francisco Bay. The maximum possible seiche in the

Bay would cause an estimated run-up of about 10 feet on either the east or west shore./17/ Thus YBC is not expected to have a seiche inundation hazard.

FOOTNOTES

/1/ Schlocker, T., 1974, Geology of the San Francisco North Quadrangle California, Professional Paper 782, U.S. Geological Survey, Washington, D.C.

/2/ Dames and Moore, 1972, Foundation Investigations, Yerba Buena Center, Exhibit Hall and Sports Arena, prepared for the City and County of San Francisco.

/3/ U.R.S. and Arthur D. Little Company, 1973, Draft Environmental Impact Report, Yerba Buena Center Public Facilities and Private Development, prepared for the City and County of San Francisco, p. V-L-25.

/4/ Schlocker, T., op. cit., p. 71

/5/ URS and Arthur D. Little Company, op. cit., p. V-L-24.

/6/ URS and Arthur D. Little Company, op. cit., p. V-L-23.

/7/ URS and Arthur D. Little Company, op. cit., p. V-L-5.

/8/ URS and Arthur D. Little Company, op. cit., p. V-L-22.

/9/ Steinbrugge, K., 1969, "Seismic Risk to Buildings and Structures on Filled Lands in San Francisco Bay," in H.P. Goldman, ed., Geologic and Engineering Aspects of San Francisco Bay Fill, Special Report 97, California Division of Mines and Geology, Sacramento.

/10/ NOAA (National Oceanic and Atmospheric Administration, 1972, A Study of Earthquake Losses in the San Francisco Bay Area, Data and Analysis, prepared for the Office of Emergency Preparedness.

/11/ San Mateo County Planning Department, 1976, Seismic and Safety Elements of the General Plan.

/12/ URS and John A. Blume Associates, 1974, San Francisco Seismic Safety Investigation, prepared for the City of San Francisco.

/13/ Nichols, D.R., and J.M. Buchanan-Banks, 1974, Seismic Hazards and Land-Use Planning, Circular 690, U.S. Geological Survey, Washington, D.C., p. 18.

/14/ URS and John A. Blume Associates, op. cit., p.23.

/15/ Youd, T.L., and S.N. Hoose, 1976, "Liquefaction during 1906 San Francisco Earthquake," Journal of the Geotechnical Engineering Division ASCE, Vol. 102, No. GT5, Proceedings Paper 12143, May 1976, p.425-439.

/16/ Garcia, A.W., and J.R. Houston, 1975, Type 16 Flood Insurance Study, Tsunami Predictions for Monterey and San Francisco Bays and Puget Sound, Technical Report H-75-17, Hydraulics Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

/17/ URS and John A. Blume Associates, op. cit., p. 31.

APPENDIX K: PUBLIC PARTICIPATION PROGRAM SUMMARY OF ACTIVITIES

Date	Activity
7/18-20/77	52 community leaders and groups with known interest in YBC were informed by phone and/or mail of the July 25th leadership meeting. A list of these contacts, and of all subsequent contacts, is on file in the Office of Environmental Review, Department of City Planning.
7/25/77	A leadership meeting was held in the Lurie Room of the Main Library from 5:00 to 6:30 p.m. The need for a new EIR and a description of the four alternatives being studied were presented, followed by a question and answer session.
7/29/77	A press release announcing the August 11th public meeting was mailed to 58 media representatives. Several with professional interest in YBC were interviewed throughout July and August.
8/03/77	The same press release was mailed to a mailing list of 292 people with known or assumed interest in YBC.
8/04/77	A follow-up letter was sent to individuals who had attended the July 25th leadership meeting, informing them of the first public meeting (August 11th).
8/04/77	A flyer announcing the August 11th public meeting was mailed to 2,194 addresses, including those of all property owners and most residences and businesses in the area bounded by First, Fifth, Market and Brannan Sts.
8/11/77	The first public meeting was held at the Silvercrest Residence (133 Shipley) at 7:30 p.m. The EIR process and a description of the alternatives were presented, followed by a question and answer period.
8/17/77	Written responses to some questions raised at the July 25th leadership meeting were distributed to individuals who had attended that meeting.
9/13/77	A presentation of the alternatives being studied in the EIR was made to the Housing Committee of the Commission on Aging at its monthly meeting.
9/14/77	A public participation update was mailed to a mailing list of 380 people with known or assumed interest in YBC. The update included announcement of the October 5th public meeting.
9/21/77	A press release announcing the October 5th public meeting was mailed to 58 media contacts.

9/23/77	A flyer announcing the October 5th public meeting was mailed to 3,081 addresses, including those of all property owners and most residences and businesses in the area bounded by First, Fifth, Market and Brannan Sts., plus the previously cited mailing list of 380 people.
10/03/77	A presentation of the alternatives studied in the EIR was made at an Ecology Center luncheon.
10/05/77	The second public meeting was held in the Lurie Room of the Main Library from 5:30 to 8:00 p.m. The alternatives were reviewed, the important environmental impacts were presented, and a question and answer session was held.
10/07/77	Members of the EIR team attended the regular meeting of the San Francisco Coalition in the Lurie Room of the Main Library to discuss the EIR and Coalition concerns, particularly about personal security in the YBC area, and YBC job potentials.
10/13/77	A presentation of the alternatives and the important environmental impacts was given at a SPUR luncheon meeting.
10/21/77	Members of the EIR team attended a second meeting of the San Francisco Coalition, at the Coalition offices at 693 Mission St., particularly for a follow-up discussion of police protection in YBC. Police Department representatives contributed to the discussion.
11/22/77	The Community Services specialist on the EIR team attended a meeting of the steering committee of the San Francisco Coalition, at 1173 Mission St., for further discussions of police protection in YBC, particularly as it related to the proposed recreation/entertainment park. A presentation on that proposed use was given by R. Gryziec.

XIV. APPENDIX K - PUBLIC PARTICIPATION PR